# LABRADOR SHELF AND GULF OF ST. LAWRENCE SEA ICE PROGRAM, 1995-1998

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# ABSTRACT

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For each winter from 1995 to 1998, ice beacons were deployed on landfast and mobile pack ice to measure ice and atmospheric properties. Four types of instruments were placed in the field: those that reported ice movement; those that measured ice pressure within floes, those that measured ice and air temperatures; and those that were equipped with anemometers to measure wind speed and direction and air temperature. Data were transmitted to satellites and relayed to the Bedford Institute of Oceanography for processing.

# RÉSUMÉ

van der Baaren, A. and S. J. Prinsenberg. 2000. Labrador Shelf and Gulf of St. Lawrence Sea Ice Program, 1995-1998. *Can. Tech. Rep. Hydrogr. Ocean. Sci.* 207: vi + 213 p.

Chaque hiver de 1995 à 1998, des balises ont été déployées sur des glaces de rive et des glaces mobiles afin de mesurer les propriétés de la glace et les propriétés atmosphériques. Quatre types d'instruments ont été placés sur le terrain : ceux signalant les mouvements de la glace, ceux mesurant la pression de la glace dans les floes, ceux mesurant la température de la glace et de l'air, et ceux munis d'anémomètres pour mesurer la vitesse et la direction du vent ainsi que la température de l'air. Les données recueillies étaient transmises par satellite et acheminées jusqu'à l'Institut océanographique de Bedford en vue de leur traitement.

# 1 INTRODUCTION

Oil exploration, fisheries, and commercial shipping off the Labrador and Newfoundland coasts and in the Gulf of St. Lawrence have placed increasing demand on our ability to monitor and predict the properties and movement of the annual pack-ice. Placing satellite-tracked beacons on the ice is an economical and safe alternative to sea ice studies using expensive ship- and helicopter-based logistics. Satellites can track beacons and report data collected by various sensors mounted on the beacons. This type of ice monitoring was successfully used in field programs of 1993 and 1994 on the Newfoundland Shelf during which time atmospheric, ice, and oceanographic data were collected (Peterson, *et al.*, 1995). The ice data included ice temperature and movement.

In 1995, the sea ice program continued to monitor the same ice data as in 1993 and 1994, but new to the program was the measurement of directional ice stress using an ice beacon developed at the Bedford Institute of Oceanography. The pressure sensor within the beacon measured either the ice pressure along a single axis or ice pressures along three axes. It is important to note that ice pressure within the pack ice primarily determines the success of navigation in ice infested areas. High ice pressure reduces ship maneuverability and increases the risk of ships and fixed platforms being damaged by pack ice.

This report presents satellite-tracked beacon data that were collected during four winter field programs, 1995 to 1998, on the Labrador Shelf and in the Gulf of St. Lawrence. In each of those years, data included ice pressure and stress, ice and air/water temperature, local wind, and ice floe location. Salinity and temperature data from CTD instrument casts below the ice were also collected while the ice beacons were being deployed, and floe thickness was measured through holes drilled in the pack-ice at each station. Since the CTD data and drilled ice thickness data augment the beacon data field programs, they are also presented. Before the complete data presentation in the appendices, there is a description of the field sites and of the instruments used to collect the measurements.

## 1.1 Study areas

One of the most distinct characteristics of the sea ice off Canada's East Coast is its dynamic movement in response to atmospheric and oceanic forcing. The predominant northwesterly winds and the strong southward flowing Labrador Current move locally formed ice and ice formed at higher latitudes rapidly southwards until the warm waters around the Grand Banks consume the ice. Although some of the advected ice enters the Gulf of St. Lawrence from the Labrador Shelf, most of the Gulf's ice is locally grown and less than 1 m thick. Under predominantly westerly winds, it moves from the Gulf to the Scotian Shelf where it melts in the warm water.

# 2 INSTRUMENTATION AND DATA COLLECTION

The satellite-tracked ice beacons, regardless of which sensors are mounted on them, all transmitted their data to satellites used by Service ARGOS. Service ARGOS provided position data for each beacon computed from the Doppler shift of the beacon transmissions to their satellites. The transmissions were received for about ten minutes on about ten satellite passes per day (Peterson, *et al.*, 1995). Five kinds of satellite-tracked beacons provided ice property data, positional data, and atmospheric data:

1. ice pressure beacons transmitted hourly ice pressure data
2. Global Positioning System (GPS) beacons transmitted hourly beacon locations
3. a temperature staff transmitted ice temperatures at selected depths either hourly or per satellite pass
4. an atmospheric ice beacon transmitted hourly air and surface ice temperatures, air pressure, and wind speed and directions; the 6 most recent data were transmitted per satellite pass
5. a basic ice beacon provided position data once per satellite pass which is less regular than the GPS beacon data

In addition, *in situ*, ice/water property measurements and ice thickness measurements were made at each field station.

Transport to and from the field sites for deployment of the beacons was by helicopter.

## 2.1 Ice pressure beacons

The ice pressure beacon is a compact, expendable unit consisting of a battery pack/ARGOS transmitter module connected by cable to a sensor probe module. The unit has two sets of three plastic diaphragms, six diaphragms in total. The plastic diaphragms in each trio are 120° apart and both sets are combined into a single machined aluminum unit (Figure 2.1.1).

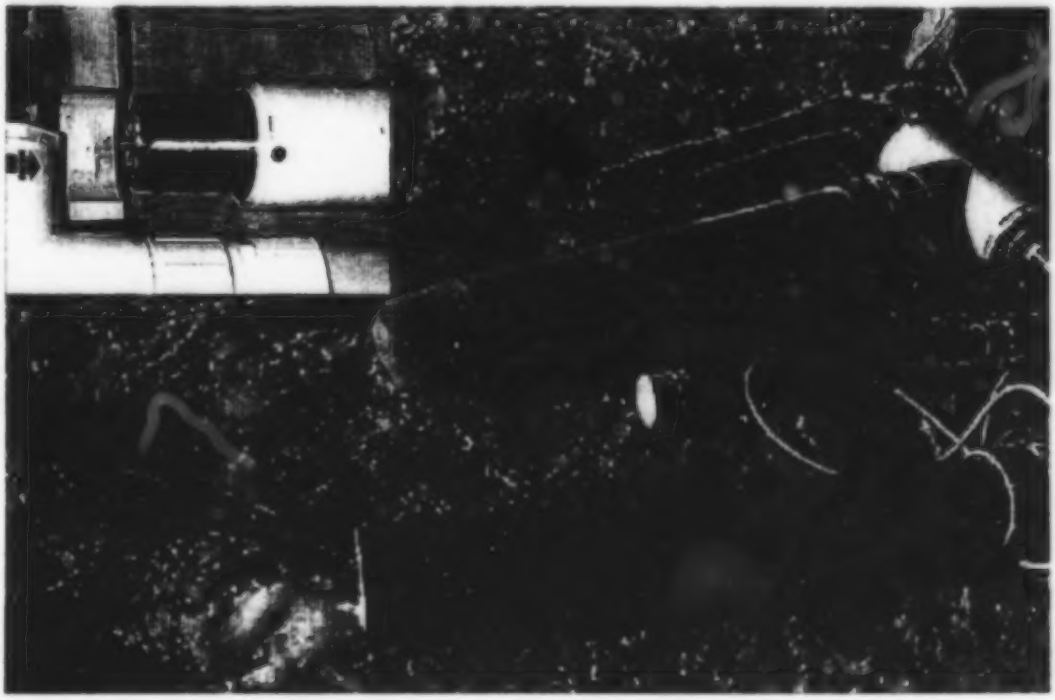

**Figure 2.1.1 Ice pressure beacon with plastic diaphragms exposed (inset).**

One set of diaphragms is exposed to the ice pressure while the other set is protected. By connecting the "active" diaphragm set to one port of a pressure transducer and the other "protected" set to the other port, the sensor is compensated for temperature variations in the ice/diaphragm/fluid assembly in addition to internal temperature compensation of the transducer itself. The three measured pressures are used to calculate major and minor principal ice stresses as well as their orientation. Before being deployed, the exposed diaphragms are frozen into a "popsicle".

This improves the chances of a prompt freeze-in of the sensor probe. The unit is also checked for proper operation and satellite-link data recovery. The unit, along with a separate battery pack, is installed in two 10-cm diameter holes in the ice.

## 2.2 GPS location beacons

GPS location beacons, manufactured by METOCEAN Data Systems Ltd. and Seimac Ltd. of Dartmouth N. S., were deployed throughout the study regions to provide hourly positional information. Beacon electronic components are contained within a sealed, fiberglass shell and the instrument is deployed such that the bottom section sits in a shallow ice hole. The Seimac GPS beacons used in 1995-1997 weighed 65

lbs. and were 95 cm long with a narrow (10 cm in diameter) bottom section that housed the battery pack (Seimac Ltd., 1995). All beacons were designed to sink after the ice floe on which they were deployed, melted, or to quit transmitting after 3 months. The battery pack of the beacons was capable of powering the internal components for at least 60 days at –35°C and 90 days at temperatures averaging –20°C. ARGOS satellites received the eight most recent hourly positions upon each pass.

## 2.3 Atmospheric beacon

METOCEAN Data Systems, Ltd. of Dartmouth, N. S, manufactured the atmospheric beacon. The R. M. Young anemometer on the beacon computed a 10-minute average of wind speed and direction each hour at 2 m above the ice surface. Other sensors collected air temperature and air pressure. The beacon contained an ARGOS transmitter which transmitted the last six hourly atmospheric data to the ARGOS satellites. Only in 1997 was there an atmospheric beacon deployed; this was placed off the coast of Prince Edward Island in the Gulf of St. Lawrence.

## 2.4 Temperature staff beacon

The temperature staff is a data transmitter and a chain of thermisters spaced at selected intervals and combined into a single unit. All the thermisters had a resolution of 0.2°C. The battery pack inside the staff section is placed below the ice/air interface while the transmitter is above the interface.

## 2.5 Basic ARGOS location beacon

The "basic" beacon, built by METOCEAN Data Systems, Ltd. of Dartmouth, N. S., transmits a message containing the beacon's reference number to the ARGOS satellite as it passes overhead (approximately every three hours). The satellite computes the location of the beacon upon each pass. This results in a series of latitudes and longitudes for that beacon which is less regular than the series obtained by the GPS beacons which store hourly GPS data internally.

## 2.6 CTD

Conductivity (salinity), temperature, and depth (CTD) data were collected near beacon deployment locations in 1996, 1997, and 1998 (Figure 7.3, Figure 7.5, and Figure 7.7) on the Labrador Shelf near Hamilton Bank. Scientists, who were dropped off on ice floes by helicopter, drilled holes through the ice and lowered the Seabird SBE-25 CTD probe to record water property data. The instrument's descent was by free-fall (gravity) and a gasoline-powered winch raised it. The accuracy/resolution of the instrument sensors is 0.004/0.0003°C for temperature, 0.0003/0.00004 Siemens/m for conductivity, and 0.25%/0.015% for depth (m). The range for each of the sensors is 0 S/m to 7 S/m for conductivity, -5°C to 35°C for temperature, and 60 m to 1000 m for depth. For a depth range of 2000 m to 10500 m, the accuracy/resolution is 0.15%/0.015% (Seabird Electronics, 1991).

## 2.7 *in situ* measurements

At many of the field stations, ice holes were drilled and floe thickness was measured and recorded. Salinity of snow/ice, brine, and water was also measured using an AO-10419 hand-held refractometer that reads to approximately ±0.5 psu (Peterson, *et al.*, 1995).

# 3 DATA PROCESSING

## 3.1 Basic ARGOS location beacon data

The ice beacon identification numbers used by ARGOS for all years are tabulated in Tables 6.1 to 6.4. The types of beacons associated with each ID number and the deployment times are also given. Latitude and longitude data from ARGOS transmission headers were used to plot where the beacons were first deployed and to where they eventually traveled. These trajectory maps are given in Appendices A, B, and C for all the ice beacons deployed in 1996 through to 1998. Note that the 1995 ARGOS positions were not mapped

since the beacons did not travel a great distance from their deployment locations that year; the reported ARGOS positions were very erratic.

## 3.2 Ice pressure beacon data

Pressure data from the uni-axial pressure sensors and air/ice temperature data measured by the pressure beacons were edited and plotted as time series. These graphs are given in Appendices D, E, F, and G, in Sections 11.2, 12.2, 13.2, and 14.2.

Pressure data from the tri-axial pressure beacon sensors were edited and major and minor principal ice stresses were computed from the data of the three sensors, p1, p2, and p3. The following equations were adapted from Hollister (1967) and were used to compute major/minor principal stresses (Prinsenberg, *et al.*, 1997):

$\sigma_1 = p + q$ major principal stress
$\sigma_2 = p - q$ minor principal stress

Where $p = [p_1 + p_2 + p_3]/3$, $q = \{2/9[(p_1 - p_2)^2 + (p_1 - p_3)^2 + (p_2 - p_3)^2]\}^{1/2}$

and $\tan(2\theta) = (p_1 - p_2)/[\sqrt{3}\,(p_3 - p)]$

$\theta$ is the angle, measured counterclockwise, between the major principal stress and the axis of $p_1$. The special computing function, "atan2", results in values of $\theta$ in the range, $[-\pi,\pi]$. In order to determine how the stress was applied within the ice, the context of the situation was taken into account. If winds were predominantly northwesterly, the assumption was that major pressure events would come from the north as long as the ice was restrained in some way at the south. $\theta$ was subtracted from the measured compass directions to find the direction in which the major principal stress acted relative to magnetic north:

measured compass direction - $\theta$ = direction of major principal stress relative to magnetic north

To find the direction of the stress relative to true north, magnetic declinations were computed and subtracted from the stress directions relative to magnetic north. The magnitude of the major and minor principal stresses are given in time series; stick plots show directions of the major principal stresses. These graphs are in Appendices E, F, and G, in Sections 12.2, 13.2, and 14.2. In 1997 the tri-axial pressure data needed a calibration correction to the compass values prior to computation of the major principal stress.

## 3.3 Atmospheric beacon data

Atmospheric data in 1997 were collected by beacon 4770. The data were put into an irregular time series where the ARGOS time stamp was used to construct the time channel. The wind vector had to be adjusted by 180°. The stick diagram of wind velocity is shown in Figure 13.5.1 in Appendix F.

## 3.4 Temperature staff beacon data

The air/water temperatures measured by the temperature staff's thermisters were edited and plotted. These temperature time series are shown in Appendices D, E, and G, in Sections 11.3, 12.3, and 14.3.

## 3.5 GPS location beacon data

Since the hourly GPS beacon data gave better resolution data than mere ARGOS positions, these data were edited for erroneous positions and then plotted in trajectory maps. Beacon positions are shown every six hours as points and dashed lines shows their entire routes. The plots for GPS beacons deployed for all four years are in four appendices, D – G, in the fourth section of each.

## 3.6 CTD

CTD data were averaged into 5-m bins and are presented in Appendices E, F, and G, in Sections 12.5, 13.4, and 14.5 in tabular and visual form. CTD header information gives the time and location of each cast. The downcast and upcast are shown for each station where available. Since ice crystals tended to contaminate the downcast data, the upcast is the most reliable. For some stations, salinity values are omitted at depths where temperatures are listed; these missing salinities are indications of erroneous conductivity samples.

# 4 SUMMARY

## 4.1 Ice drift

Beacons that were deployed in the Northumberland Strait and in the Gulf of St. Lawrence, north of Prince Edward Island, generally followed a mean eastward drift. In some cases the ice floes drifted out of the Gulf through Cabot Strait or ended up near the western Newfoundland coast northeast of their starting point.

In 1997, several beacons were placed west of Point North to measure ice convergence and ice pressure. One of these (beacon 972), traveled eastward around the point but the other six were unable to make it around. It is noted that the six that did not make it stopped functioning before the one that completed the circumnavigation.

Also in 1997, beacon 4770 was equipped with an anemometer and deployed west of Point North. It operated for four days, stopped transmitting, and then restarted itself after it had moved east of Point North in the Gulf of St. Lawrence. Its trajectory, east of Point North, closely followed the coastline after a short trip north. A regular time series of wind velocity components was constructed by interpolating the wind data into hourly values. The ARGOS reported positions were also interpolated into a regular hourly time series. Six-hourly mean wind speed values were computed and the beacon's drift speed over six hours was computed. When the two speeds were correlated using a complex correlation analysis, the turning angle was computed to be 14°, its gain to be 2%, and the wind was found to account for 38% of the variance in the ice motion. Similar gain and turning angles, but larger variances, are found for offshore pack ice conditions (Greenan, *et al.*, 1997).

After construction of Confederation Bridge was completed, beacons deployed in the vicinity of the bridge in 1998 tended to travel back and forth near/beneath the bridge due to tidal forcing, but generally tracking slowly eastward as expected (Figures 14.4.1 - 14.4.5).

Beacons deployed off the Labrador coast tended to drift southeasterly with the Labrador Current and the predominant northwesterly winds as expected (see also Peterson, 1990; Peterson, *et al.*, 1995; and Greenan, *et al.*, 1997).

## 4.2 Ice pressure

The difficulty in measuring ice pressure at the latitudes of this study is that the ice is not always thick or solid enough for meaningful pressures to be measured. The pressure sensor can be frozen into the ice at the time of deployment, but quickly be sitting in slush with sudden changes in climatic conditions. Then, no pressure can be detected. This was often the case and can be seen in the time series of some of the pressure sensors (*e. g.* Figures 12.2.3, 12.2.4, 13.2.2, 13.2.4, 13.2.5, and 13.2.6). The traces start out with a sharp spike indicating the freeze-in cycle but fall off quickly over a short time. The freezing point of the seawater is about –2°C and many of the ice temperature traces show values near this or above this when the pressure traces show little or no ice pressure.

When one of the sensors of the tri-axial set-up was unable to detect a pressure signal then a directed ice stress could not be confidently computed. This was the case in 1996 for beacons 1052 and 1055, in 1977 for beacon 1055, and in 1998 for beacons 1055 and 2362.

In 1995, the use of the uni-axial pressure sensor in landfast and pack-ice in Labrador lead to the development of the deployment method first freezing the sensor into an "ice popsicle" and then placing the frozen sensor unit into the drilled hole to completely freeze into the floe.

In 1996, the directed ice stress measured by beacon 1054 off Labrador was along a southwesterly axis (Figure 12.2.5). The pack ice itself traveled to the southeast (Figure 12.4.3). In 1997, beacons 976 and 1053 measured directed ice stresses along the same axis, northeast to southwest (Figures 13.2.4 and 13.2.5) while the pack ice traveled in a southeasterly direction (Figures 14.3.4 and 14.3.6). The offshore pack ice seemed to exert the mean northeast to southwest stress on the inshore ice pack.

In the Gulf of St. Lawrence the mean ice stress was directed southeasterly for beacon 1055 in 1997 (Figure 13.2.6). The pack ice was pushing the floes against the coast of Prince Edward Island on the western shores of Point North.

## 4.3 Ice thickness and salinity

In the Northumberland Strait and in the Gulf of St. Lawrence, within the ice sheet, ice salinities were generally in the range of 4-8 psu, at times reaching 15 psu. Surface ice and snow had salinities in the range of 0 psu to 2 psu. Ice thickness of undeformed, level ice ranged from 30 cm to over 1 m. In Labrador, salinity for surface ice and snow was occasionally higher (4.8 psu) since flushing of salt by melting snow had not occurred. Ice thickness in Labrador also ranged from 30 cm to over 1 m for undeformed, level ice.

## 4.4 Below-ice water properties

Surface seawater below the ice had salinities upwards of 30 psu or more in the Gulf of St. Lawrence. CTD casts over Hamilton Bank indicate a homogeneous surface layer with water temperature and salinity generally increasing at depth with occasional exceptions because of possible ice crystals in near-surface samples (*e. g.* Figure 12.5.4).

# ACKNOWLEDGMENT

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# 6 TABLES

**Table 6.1 Summary of 1995 ARGOS beacon data (Labrador)**

| TYPE OF BEACON | ID | DEPLOYMENT LOCATION | POWER-ON or DEPLOYMENT TIME (GMT) | SHUT-OFF or RECOVERY TIME (GMT) | DATA START (GMT) | DATA END (GMT) |
|---|---|---|---|---|---|---|
| **pressure (uni-axial)** sampling interval = 12 min. | 22191 | pack-ice | 88 15:10 | 94 15:18 | 88 10:50 | 94 13:40 |
| | 22192 | landfast ice | 61 16:20 | 88 20:45 | 66 3:25 | 88 13:50 |
| | 22193 | landfast ice | 61 16:30 | 88 20:45 | 66 3:25 | 88 06:48 |
| | | pack-ice | 94 15:18 | sank | 94 14:12 | 115 17:13 |
| **temperature staff** sampling interval = 1 hr. | 02347 | landfast ice | 61 16:20 | 88 20:45 | 64 15:37 | 88 13:41 |
| | 02367 | landfast ice | 61 16:30 | 88 13:30 | 61 18:51 | 89 15:16 |
| | | pack-ice | 88 15:10 | sank | 91 15:21 | 99 14:47 |
| **GPS** sampling interval = 1 hr. | 10053 | landfast ice | 61 16:00 | 94 17:10 | 61 18:00 | 94 16:00 |
| | 10054 | landfast ice | 60 18:30 | 88 13:30 | 60 19:00 | 88 14:00 |
| | | pack-ice C | 88 15:10 | sank | 88 16:00 | 135 15:00 |
| | 21596 | landfast ice | 60 18:30 | 88 13:30 | 60 19:00 | 83 14:00 |
| | | pack-ice SE | 88 16:00 | sank | 88 17:00 | 145 17:00 |
| | 21597 | landfast ice | 61 16:00 | 88 13:30 | 61 18:00 | 87 14:00 |
| | | pack-ice SW | 88 16:00 | sank | 88 17:00 | 145 17:00 |
| | 21598 | landfast ice | 61 16:00 | 88 20:45 | 61 18:00 | 88 19:00 |
| | 21599 | landfast ice | 61 16:00 | 88 13:30 | 61 18:00 | 88 14:00 |
| | | pack-ice N | 88 16:00 | sank | 88 16:00 | 145 08:00 |

**NOTES:**

- **Landfast ice site off Foxe Island** **54°34.32'N** **57°13.57'W**
- **Offshore pack-ice site off Cape Harrison**
  - **C (center)** **54°51.42'N** **57°27.82'W**
  - **SE corner was 1.4 Nmi from center**
  - **SW corner was 1.6 Nmi from center**
  - **N corner was 1.0 Nmi from center**
- **10053 was lost then found on day 94**
- **All GPS beacons were tested at Lake Melville from day 58 to day 60 before field deployment on the landfast ice.**
- **Beacons deployed on the offshore pack ice remained near the deployment site for approximately 47 days with very little movement.**

**Table 6.2 Summary of 1996 ARGOS beacon data (Labrador (Lab) and Gulf of St. Lawrence (GSL))**

| TYPE OF BEACON | ID | DEPLOYMENT LOCATION | POWER-ON or DEPLOYMENT TIME (GMT) | SHUT-OFF or RECOVERY TIME (GMT) | DATA START (GMT) | DATA END (GMT) |
|---|---|---|---|---|---|---|
| **pressure (uni-axial)** sampling interval = 1 hr. | 22192 | station 1 Lab | 71 19:00 | sank | 71 21:35 | 79 17:35 |
| | 22195 | station 3 Lab | 70 19:45 | sank | 70 20:45 | 96 10:45 |
| | 22196 | station 6 Lab | 73 19:30 | sank | 73 20:30 | 97 00:30 |
| **pressure (tri-axial)** sampling interval = 1 hr. | 01052 | station 6 Lab | 73 19:30 | sank | 73 20:30 | 102 08:30 |
| | 01054 | station 3 Lab | 70 19:45 | sank | 70 20:45 | 82 04:45 |
| | 01055 | station 1 Lab | 71 19:00 | sank | 71 21:35 | 79 17:35 |
| **basic beacon** sampling interval = per ARGOS pass | 00966 | station 2 GSL | 58 20:25 | sank | 58 20:51 | 93 15:55 |
| | 00969 | station 3 GSL | 59 14:30 | sank | 59 15:27 | 87 15:21 |
| | 00975 | station 18.1 Lab | 78 14:00 | sank | 78 15:25 | 123 17:14 |
| | 02362 | station 15 GSL | 65 13:30 | sank | 65 16:01 | 99 12:54 |
| | 02364 | GSL | 67 | sank | 67 17:19 | 87 13:52 |
| | 02365 | CTD 5 Lab | 79 13:50 | sank | 79 15:03 | 115 08:50 |
| | 11248 | GSL | 51 | N/A | 51 5:19 | 106 18:37 |
| | 11249 | station 4 GSL | 60 15:50 | N/A | 61 16:52 | 121 13:08 |
| | 11251 | GSL | 51 | N/A | 51 5:19 | 96 18:47 |
| | 11254 | GSL | 51 | N/A | 51 5:19 | 103 05:59 |
| **temperature staff** sampling interval = 1 hr. | 02347 | station 1 Lab | 71 20:00 | N/A | 71 22:50 | 79 15:17 |
| **GPS** sampling interval = 1 hr. | 21598 | station 4 Lab | 70 20:05 | sank | 70 21:00 | 100 18:00 |
| | 26366 | station 7 Lab | 73 20:29 | sank | 73 20:00 | 124 05:00 |
| | 26368 | station 9 Lab | 73 20:45 | sank | 73 21:00 | 89 21:00 |
| | 26370 | station 8 Lab | 73 20:45 | sank | 73 22:00 | 94 22:00 |
| | 26373 | station 1 Lab | 71 18:45 | sank | 71 20:00 | 85 18:00 |
| | 26374 | station 6 Lab | 73 19:30 | sank | 73 20:00 | 96 07:00 |
| | 26376 | station 5 Lab | 70 20:30 | sank | 70 21:00 | 96 20:00 |
| | 26377 | station 11 GSL | 61 15:29 | sank | 61 16:00 | 69 23:00 |
| | 26378 | station 3 Lab | 70 19:45 | sank | 70 20:00 | 82 06:00 |
| | 26379 | station 2 Lab | 70 19:08 | sank | 70 19:00 | 104 17:00 |
| | 26381 | station 9 GSL | 61 14:55 | sank<br>interpolated file | 61 15:00<br>62 00:00 | 88 11:00<br>88 00:00 |
| | 26382 | station 5 GSL | 60 16:10 | sank | 60 22:00 | 88 23:00 |
| | 26383 | station 12 GSL | 61 19:38 | sank | 61 20:00 | 88 08:00 |
| | 26384 | station 10 GSL | 61 15:14 | sank<br>interpolated file | 61 16:00<br>62 00:00 | 77 23:00<br>77 23:00 |
| | 26385 | station 6 GSL | 60 16:30 | sank | 60 18:00 | 82 23:00 |
| | 26386 | station 8 GSL | 60 20:00 | sank | 60 22:00 | 88 16:00 |
| | 26387 | station 7 GSL | 60 19:35 | sank | 60 22:00 | 88 13:00 |
| | 26388 | station 16 GSL | 65 16:00 | sank | 65 17:00 | 82 10:00 |

**NOTES:**

**Gulf of St. Lawrence stations:**

- **station 1**, west Northumberland Strait — **45°22.52'N 64°14.37'W**
- **station 2**, 150 km N of Prince Edward Island — **47°53.401'N 63°22.856'W**
- **station 3**, west Northumberland Strait — **46°18.452'N 64°08.234'W**
- **station 4** — **47°43.28'N 62°15.21'W**
- **station 5** — **47°53.98'N 62°35.05'W**

| | | |
|---|---|---|
| • **station 6** | **47°54.71'N** | **62°51.45'W** |
| • **station 7** | **48°09.0'N** | **62°54.0'W** |
| • **station 8** | **48°09.0'N** | **62°35.0'W** |
| • **station 9** | **47°54.0'N** | **62°30.0'W** |
| • **station 10** | **47°53.0'N** | **62°36.0'W** |
| • **station 11** | **47°50.0'N** | **62°31.0'W** |
| • **station 12** | **47°48.0'N** | **62°35.0'W** |
| • **station 13**, 20 km W of Magdalen Islands | **47°28.0'N** | **62°05.0'W** |
| • **station 14**, area of Confederation Bridge | **46°06.0'N** | **63°39.0'W** |
| • **station 15**, west of Confederation Bridge | **46°16.0'N** | **63°48.0'W** |
| • **station 16**, area of Confederation Bridge | **47°49.0'N** | **62°20.0'W** |
| • **station 17**, area of Confederation Bridge | **47°44.0'N** | **61°52.0'W** |
| • **station 18**, north of Prince Edward Island | **46°46.9'N** | **63°22.9'W** |
| • **station 19**, offshore of Magdalen Islands | **47°28.0'N** | **61°54.0'W** |

**Labrador stations:**

| | | |
|---|---|---|
| • **station 1**, landfast calibration line, Packs Harbour north of Huntingdon Island | **53°51.67'N** | **56°59.55'W** |
| • **station 2** | **54°03.42'N** | **55°27.27'W** |
| • **station 3** | **54°03.58'N** | **55°27.24'W** |
| • **station 4** | **54°04.18'N** | **55°28.88'W** |
| • **station 5** | **54°04.32'N** | **55°22.63'W** |
| • **station 6** | **54°40.33'N** | **56°20.04'W** |
| • **station 7** | **54°42.97'N** | **56°22.30'W** |
| • **station 8** | **54°39.54'N** | **56°12.66'W** |
| • **station 9** | **54°37.27'N** | **56°23.31'W** |
| • **Table Bay** | **53° 28.24'N** | **56° 25.40'W** |
| • **Station 14.4**, black, landfast ice | | |
| • **station 14.5**, bright, thin, landfast ice, 100 m NE of site | | |
| • **station 14.6**, black, landfast ice 5 km NE of station 14.5 | | |
| • **station 14.7**, black, thin, landfast ice, 5 km NE of station 14.5 | | |
| • **calibration line** | **53°52.68'N** | **56°59.51'W** |
| • **station 15.8**, N of calibration line | | |
| • **station 15.9**, NW of calibration line | | |
| • **station 15.10**, strand station, dull, landfast area | **53°53.33'N** | **56°09.85'W** |
| • E of Huntingdon Island | **53°45.75N** | **56°51.28'W** |
| • **station 15.11**, dull, landfast area | | |
| • **station 15.12**, bright band against thick ice | | |
| • **station 15.13**, 2nd calibration line E of Huntingdon Island, dull, landfast area | **53°53.81'N** | **53°44.73'W** |
| • **station 18.1**, off Spotted island | **53°36.14'N** | **55°33.84'W** |
| • **CTD station 1**, Hamilton Bank | **54°08.84'N** | **54°57.74'W** |
| • **CTD station 2**, Hamilton Bank | **54°03.47'N** | **55°05.91'W** |
| • **CTD station 3**, Hamilton Bank | **53°59.90'N** | **55°20.29'W** |
| • **CTD station 4**, 60 km off Grady Island | **53°56.30'N** | **55°36.97'W** |
| • **CTD station 5**, 40 km off Grady Island | **53°53.03'N** | **55°55.31'W** |
| • **CTD station 6**, 20 km off Grady Island | **53°50.44'N** | **56°08.27'W** |

**Table 6.3 Summary of 1997 ARGOS beacon data (Labrador (Lab) and Gulf of St. Lawrence (GSL))**

| TYPE OF BEACON | ID | DEPLOYMENT LOCATION | POWER-ON or DEPLOYMENT TIME (GMT) | SHUT-OFF or RECOVERY TIME (GMT) | DATA START (GMT) | DATA END (GMT) |
|---|---|---|---|---|---|---|
| **pressure (uni-axial)** sampling interval = 1 hr. | 22192 | station 25-1 GSL | 56 19:20 | 71 sank | 56 20:20 | 71 17:20 |
| | 02361 | station 5-2 C Lab | 64 18:25 | sank | 65 08:25 | 94 12:25 |
| | 02362 | station 5-1 C Lab | 64 14:25 | sank | 65 02:25 | 68 00:25 |
| **pressure (tri-axial)** sampling interval = 1 hr. | 00976 | station 5-2 C Lab | 64 18:20 | sank | 65 07:20 | 78 09:20 |
| | 01053 | station 5-1 C Lab | 64 14:35 | sank | 65 01:35 | 67 23:35 |
| | 01055 | station 25-1 GSL<br>station 12-1 GSL | 56 19:20 | 71 removed | 56 20:20 | 71 17:20 |
| **basic beacon** sampling interval = per ARGOS pass | 02363 | station 17-2 GSL | 76 22:15 | unknown | 79 23:18 | 120 10:11 |
| | 04765 | GSL | 70 13:20 | unknown | 70 13:27 | 79 13:31 |
| **atmospheric** sampling interval = 1 hr. | 04770 | station 25-6 GSL | 56 20:50 | unknown | 56 21:24 | 78 23:38 |
| **GPS** sampling interval = 1 hr. | 00968 | station 21-2 GSL<br>station 26-1 GSL | 52 15:10<br>57 17:00 | 57 14:00<br>sank | 52 14:00<br>57 20:00 | 57 14:00<br>65 23:00 |
| | 00970 | station 25-3 GSL | 56 19:20 | sank | 56 20:00 | 66 06:00 |
| | 00971 | station 25-4 GSL | 56 19:20 | sank | 56 21:00 | 72 17:00 |
| | 00972 | station 20-1 GSL<br>station 26-2 GSL | 52 14:00<br>57 17:00 | 57 14:00<br>sank | 52 15:00<br>57 21:00 | 57 14:00<br>72 07:00 |
| | 00973 | station 25-2 GSL | 56 19:20 | sank | 56 21:00 | 66 06:00 |
| | 00974 | station 28-1 GSL | 59 13:45 | 70 19:30 | 59 14:00 | 70 19:00 |
| | 05215 | station 5-2 E Lab | 64 17:40 | sank | 64 18:00 | 105 22:00 |
| | 05216 | station 5-2 W Lab | 64 17:35 | sank | 64 18:00 | 97 17:00 |
| | 05217 | station 5-2 C Lab | 64 17:15 | sank | 64 18:00 | 100 09:00 |
| | 05218 | station 5-2 N Lab | 64 17:50<br>interpolated file* | sank<br>N/A | 64 19:00<br>65 00:00 | 130 22:00<br>130 22:00 |
| | 10053 | station 5-1 W Lab | 64 13:30 | sank | 64 15:00 | 75 23:00 |
| | 26367 | station 5-2 S Lab | 64 18:00<br>interpolated file* | sank<br>N/A | 64 18:00<br>65 00:00 | 73 06:00<br>73 00:00 |
| | 26368 | Lab (northern) | 62 17:06 | unknown | 87 00:00 | 91 18:00 |
| | 26369 | station 5-1 S Lab | 64 14:30<br>interpolated file* | sank<br>N/A | 65 16:00<br>65 00:00 | 106 21:00<br>109 18:00 |
| | 26370 | Gulf 3 GSL | 55 16:00 | sank | 55 19:00 | 81 17:00 |
| | 26371 | station 5-1 E Lab | 64 15:00 | sank | 64 15:00 | 117 05:00 |
| | 26372 | station 5-1 N Lab | 64 14:30 | sank | 64 15:00 | 120 16:00 |
| | 26373 | station 5-1 C Lab | 64 15:10 | sank | 64 15:00 | 67 08:00 |
| | 26374 | Gulf 1 GSL | 55 16:00<br>interpolated file* | sank<br>N/A | insufficient<br>56 00:00 | insufficient<br>75 21:00 |
| | 26375 | station 25-5 GSL | 56 20:20<br>interpolated file* | 57 20:10<br>N/A | 57 13:00<br>57 07:00 | 64 18:00<br>64 18:00 |

| TYPE OF BEACON | ID | DEPLOYMENT LOCATION | POWER-ON or DEPLOYMENT TIME (GMT) | SHUT-OFF or RECOVERY TIME (GMT) | DATA START (GMT) | DATA END (GMT) |
|---|---|---|---|---|---|---|
| GPS | 26376 | GSL | 49 22:20 | unknown | 49 21:00 | 114 20:00 |
| sampling interval = 1 hr. | 26378 | Lab (northern) | 62 17:10 | N/A | 79 22:00 | 80 11:00 |
| | | | | N/A | 86 19:00 | 89 15:00 |
| | | | | unknown | 89 17:00 | 91 13:00 |
| | 26379 | station 20-1 GSL | 51 21:45 | 52 removed | 52 01:00 | 52 13:00 |
| | | Gulf 2 GSL | 55 18:15 | sank | 55 18:00 | 72 20:00 |
| | 26380 | station 25-1 GSL | 56 18:20 | 57 removed | no data | no data |
| | 26382 | Lab (northern) | unknown | unknown | 86 18:00 | 89 16:00 |
| | | | unknown | unknown | 89 18:00 | 91 13:00 |
| | 26383 | Lab (northern) | unknown | unknown | 87 20:00 | 91 14:00 |
| | 26384 | station 19-1 GSL | 78 14:45 | unknown | 78 15:00 | 111 11:00 |
| | | | interpolated file | N/A | 79 00:00 | 111 00:00 |
| | 26385 | Gulf 5 GSL | 77 20:55 | unknown | 77 21:00 | 91 22:00 |
| | 26386 | Gulf 4 GSL | 77 15:05 | unknown | 77 15:00 | 105 04:00 |
| | 26387 | Lab (stationary) | unknown | unknown | 49 20:00 | 107 13:00 |
| | 26388 | Lab (northern) | unknown | unknown | 87 19:00 | 91 10:00 |
| | | | interpolated file | N/A | 88 00:00 | 91 14:00 |

**NOTES:**

**Gulf of St. Lawrence stations:**

- **station 20-1**, Feb. 20, IOS test station — **46°16.85'N 64°14.37'W**
- **station 21-2**, Feb. 21, DREP-N station
- **station 23-1**, Feb. 23, landfast ice Cape Gage — **46°58.878'N 64°12.415'W**
- **Gulf 1**, station 24-1, Feb. 24 — **46°50.0'N 62°00.0'W**
- **Gulf 2**, station 24-2, Feb. 24 — **48°10.0'N 61°40.0'W**
- **Gulf 3**, station 24-3, Feb. 24 — **47°30.0'N 63°00.0'W**
- **Gulf 4**, station 18-1, Mar. 18 — **47°31.0'N 63°15.0'W**
- **Gulf 5**, station 18-2, Mar. 18 — **48°06.4'N 62°09.3'W**
- **station 25-1**, Feb. 25, pressure station, center — **46°56.65'N 64°17.37'W**
  - **station 26-1**, Feb. 26, pressure station, on the move — **46°57.20'N 64°17.35'W**
  - **station 12-1**, Mar. 12, ice pressure beacons, on the move
- **station 25-2**, W-GPS, 2.5 km west of center
- **station 25-3**, N-GPS, 2.6 km north of center — **46°59.43'N 64°17.13'W**
- **station 25-4**, S-GPS, 2.7 km south of center
- **station 25-5**, Feb. 25, E-GPS, 2.1 km east of center — **46°58.87'N 64°14.42'W**
  - **station 26-2**, Feb. 26, E-GPS
- **station 25-6**, Feb. 25, atmospheric station on inshore landfast ice — **46°55.77'N 64°12.19'W**
  - **station 11-2**, Mar. 11, atmospheric station on the move
- **Strait 1** — **46°53.55'N 64°15.05'W**
  - station 28-1, Feb. 28, IOS acoustic station on landfast ice Cape Gage
  - station 11-1, Mar. 11, IOS acoustic station on the move
  - station 17-2, Mar. 17, west of Confederation Bridge
- **station 17-1**, Mar. 17, calibration lines, Point Prim
  - Mar. 17 — **46°02.146'N 62°57.326'W**
  - Mar. 19 — **46°02.149'N 62°57.316'W**
  - Mar. 23 — **46°02.154'N 62°57.335'W**
- **station 19-1**, Mar. 19, ice rubble field — **47°07.3'N 62°44.1'W**
  - Mar. 20 — **46°57.0'N 62°38.9'W**

| | | |
|---|---|---|
| • Mar. 20 | 46°57.0'N | 62°38.9'W |
| • Mar. 20 | 46°56.0'N | 62°34.5'W |
| • **station 19-2**, Mar. 19, Ainslie Lake, Cape Breton Island | 46°10.0'N | 61°15.0'W |
| • **station 21-1**, Mar. 21, pack-ice | 46°40'N | 62°30'W |
| • **station 22-1**, Mar. 22, Tracadie Bay | 46°27.2'N | 62°48.9'W |
| • **station 24-1**, Mar. 24, Tracadie Bay | 46°26.2'N | 62°55.2'W |
| • **station 25-1**, Mar. 25, calibration line, landfast ridge off Tracadie Bay | 46°26.05'N | 62°5.36'W |

**Labrador stations:**

| | | |
|---|---|---|
| • **station 5-1**, center | 54°06.27'N | 55°23.89'W |
| • **W-GPS**, 2.31 km west of center | | |
| • **N-GPS**, 2.04 km north of center | | |
| • **S-GPS**, 2.01 km south of center | | |
| • **E-GPS**, 2.11 km east of center | | |
| • **station 5-2**, center | 54°25.804'N | 55°59.051'W |
| • **W-GPS**, 2.1 km west of center | | |
| • **N-GPS**, 2.1 km north of center | | |
| • **S-GPS**, 2.21 km south of center | | |
| • **E-GPS**, 2.1 km east of center | | |
| • **CTD 1** | 54.1450°N | 54.8695°W |
| • **CTD 2** | 54.0811°N | 55.0935°W |
| • **CTD 3** | 54.0115°N | 55.3030°W |
| • **CTD 4** | 53.9668°N | 55.5706°W |
| • **CTD 5** | 53.8913°N | 55.8305°W |
| • **CTD 6** | 53.8593°N | 56.0278°W |
| • **CTD 7** | 53.8005°N | 56.2312°W |

**Table 6.4 Summary of 1998 ARGOS beacon data (Labrador (Lab) and Gulf of St. Lawrence (GSL))**

| TYPE OF BEACON | ID | DEPLOYMENT LOCATION | POWER-ON or DEPLOYMENT TIME (GMT) | SHUT-OFF or RECOVERY TIME (GMT) | DATA START (GMT) | DATA END (GMT) |
|---|---|---|---|---|---|---|
| **pressure (uni-axial)** sampling interval = 1 hr. | 00978 | station 7.6 Lab | 66 20:30 | N/A | 66 14:39 | 89 02:39 |
| | 01053 | station 23.1 GSL | 54 15:07 | removed | 54 16:07 | 83 15:07 |
| | 04768 | station 7.1 Lab | 66 17:00 | N/A | no data | no data |
| | 22191 | station 22.2 GSL | 53 15:45 | N/A | 59 13:45 | 74 17:45 |
| **pressure (tri-axial)** sampling interval = 1 hr. | 00977 | station 7.1 Lab | 66 17:00 | N/A | 66 18:00 | 83 13:00 |
| | 01055 | station 22.2 GSL | 53 15:45 | N/A | 53 17:45 | 74 18:45 |
| | 02362 | station 7.6 Lab | 66 20:30 | N/A | 66 22:30 | 89 00:30 |
| | 02364 | station 23.1 GSL | 53 15:07 | removed | 54 16:07 | 83 15:07 |
| **temperature chain** sampling interval = 1 hr. | 04764 | station 7.6 Lab | 66 20:30 | N/A | 67 00:28 | 89 02:24 |
| **GPS** sampling interval = 1 hr. | 00974 | station 7.11 Lab | 66 | N/A | 66 23:00 | 124 21:00 |
| | 02754 | station 18.6 GSL | 49 19:45 | removed | 49 19:00 | 55 19:00 |
| | 02755 | station 18.4 GSL | 49 19:20 | sank | 49 19:00 | 68 20:00 |
| | 02756 | station 18.5 GSL | 49 19:35 | N/A | 49 19:00 | 95 08:00 |
| | 02757 | station 18.7 GSL | 49 20:10 | sank | no data | no data |
| | 03121 | station 22.5 GSL | 53 17:00 | sank | 53 17:00 | 85 16:00 |
| | 03122 | station 22.5 GSL | 53 17:00 | N/A | 53 17:00 | 92 23:00 |
| | 03123 | station 22.3 GSL | 53 17:00 | sank | 53 17:00 | 57 00:00 |
| | 03124 | station 22.2 GSL | 53 15:45 | N/A | 53 15:00 | 100 12:00 |
| | 04457 | station 23.4 GSL | 54 18:44 | sank | 54 18:00 | 63 12:00 |
| | 04458 | station 20.3 GSL | 51 19:30 | N/A | 51 20:00 | 92 13:00 |
| | 04459 | station 20.2 GSL | 51 19:15 | sank | 51 20:00 | 73 20:00 |
| | 08537 | station 7.3 Lab | 66 19:00 | N/A | 66 19:00 | 117 17:00 |
| | 08538 | station 7.5 Lab | 66 19:20 | N/A | 66 20:00 | 89 22:00 |
| | 08539 | station 7.2 Lab | 66 18:50 | N/A | 66 18:00 | 117 00:00 |
| | 08540 | station 7.6 Lab | 66 20:30 | sank | 66 20:00 | 84 16:00 |
| | 08541 | station 23.1 GSL | 54 15:07 | removed | 54 15:00 | 83 14:00 |
| | 08542 | station 23.3 GSL | 54 15:29 | removed | 54 15:00 | 83 13:00 |
| | 08543 | station 23.2 GSL | 54 15:15 | N/A | 54 15:00 | 94 14:00 |
| | 08545 | station 7.4 Lab | 66 19:10 | N/A | 66 19:00 | 113 22:00 |
| | 08546 | station 7.1 Lab | 66 17:00 | N/A | 66 19:00 | 113 00:00 |
| | 10055 | station 7.7 Lab | 66 20:30 | N/A | 66 20:00 | 104 22:00 |
| | 10056 | station 7.8 Lab | 66 20:30 | N/A | 66 21:00 | 122 23:00 |
| | 10057 | station 7.9 Lab | 66 20:30 | N/A | 66 22:00 | 108 11:00 |
| | 10058 | station 7.10 Lab | 66 20:30 | N/A | 66 21:00 | 96 09:00 |
| | 26368 | station 11.1 GSL | 70 | sank | 71 12:00 | 81 14:00 |
| | 26378 | station 11.2 GSL | 70 | N/A | 71 12:00<br>82 19:00 | 82 16:00<br>94 20:00 |
| | 26380 | station 14.1 GSL | 73 | N/A | no data | no data |
| | 26381 | station 21.1 GSL | 52 15:30 | N/A | 52 15:00 | 100 19:00 |
| | 26382 | station 11.3 GSL | 70 | N/A<br>N/A | 72 19:00<br>84 01:00 | 74 17:00<br>98 15:00 |
| | 26383 | station 11.3 GSL | 70 | sank | 70 20:00 | 81 19:00 |

**NOTES:**

## Gulf of St. Lawrence stations:

| | | |
|---|---|---|
| • **station 17.1**, landfast ice off Cape Gage | 46°53.85'N | 64°14.87'W |
| • **station 18.2**, pack-ice off Cape Gage | 46°57.71'N | 64°21.99'W |
| • **station 18.3**, pack-ice off Cape Gage | 46°57.39'N | 64°24.63'W |
| • **station 18.4**, pack-ice in Northumberland Strait, NW of Confederation Bridge | 46°17.10'N | 63°50.14'W |
| • **station 18.5**, pack-ice in Northumberland Strait, SW of Confederation Bridge | 46°14.5'N | 63°53.00'W |
| • **station 18.6**, pack-ice in Northumberland Strait, SE of Confederation Bridge | 46°07.44'N | 63°41.03'W |
| • **station 18.7**, pack-ice in Northumberland Strait, NE of Confederation Bridge | 46°10.54'N | 63°38.77'W |
| • **station 20.1**, calibration line in Hillsborough Bay | 46°05.1'N | 63°02.9'W |
| • **station 22.1**, calibration line on 53 at 14:30 GMT | | |
| • **station 22.6**, calibration line on 53 at 20:00 GMT | | |
| • **station 20.2**, pack-ice in Northumberland Strait, NE of Confederation Bridge | 46°07.95'N | 63°35.04'W |
| • **station 20.3**, pack-ice in Northumberland Strait, SE of Confederation Bridge | 46°05.27'N | 63°37.34'W |
| • **station 21.1**, pack-ice off Cape Gage | 46°59.14'N | 64°36.53'W |
| • **station 21.2**, pack-ice off N coast of PEI (temporary landfast ice) | 46°27.5'N | 62°56.4'W |
| • **station 22.2**, ice pressure station 1 | 46°41.47'N | 64°30.92'W |
| • **station 22.3**, N corner of triangle | 46°43.76'N | 64°32.49'W |
| • **station 22.4**, SE corner of triangle | 46°40.18'N | 64°26.79'W |
| • **station 22.5**, SW corner of triangle | 46°38.57'N | 64°33.93'W |
| • **station 23.1** ice pressure station 2 | 46°29.46'N | 64°23.13'W |
| • **station 23.2**, N corner of triangle | 46°32.06'N | 64°23.59'W |
| • **station 23.3**, SW corner of triangle | 46°26.31'N | 64°25.39'W |
| • **station 23.4**, SE corner of triangle | 46°29.31'N | 64°19.06'W |
| • **station 11.1**, seal herd N of North Point | | |
| • **station 11.2**, seal herd N of North Point | | |
| • **station 11.3**, seal herd N of Summerside | | |
| • **station 14.1**, pancake ice rubble N of North Point | | |
| • **station 18.1**, calibration line SE of Point Egmont | 46°19.91'N | 64°04.5'W |

## Labrador stations:

| | | |
|---|---|---|
| • **station 7.1**, southern pressure station, center | 53°44.078'N | 55°38.263'W |
| • **station 7.2**, NE GPS, 50°mag., 2.1 mi. from center | | |
| • **station 7.3**, SE GPS, 140°mag., 2.2 mi. from center | | |
| • **station 7.4**, SW GPS, 230°mag., 2.1 mi. from center | | |
| • **station 7.5**, NW GPS, 320°mag., 2.2 mi. from center | | |
| • **station 7.6**, northern pressure station, center | 54°44.20'N | 56°25.0'W |
| • **station 7.7**, NW GPS, 320°mag., 2.1 mi. from center | | |
| • **station 7.8**, SE GPS, 140°mag., 2.2 mi. from center | | |
| • **station 7.9**, NE GPS, 50°mag., 2.1 mi. from center | | |
| • **station 7.10**, SW GPS, 230°mag., 2.2 mi. from center | | |
| • **station 7.11**, ice drift station inshore of station 7.6 | 54°06.0'N | 56°36.0'W |
| • **CTD 4**, Hamilton Bank, Mar. 6 | 53°58.373'N | 55°43.64'W |
| • **CTD 5**, Hamilton Bank, Mar. 6 | 53°54.02'N | 55°51.87'W |
| • **CTD 6**, Hamilton Bank, Mar. 6 | 53°50.73'N | 56°03.33'W |
| • **CTD 7**, Hamilton Bank, Mar. 6 | 53°48.44'N | 56°11.55'W |
| • **CTD 2479**, ice melt beacon, Hamilton Bank, Mar. 7 | 53°42.73'N | 55°40.317'W |

- **CTD 2374**, ice melt beacon, Hamilton Bank, Mar. 7 **54°09.16'N** **56°02.5'W**

# 6 FIGURES

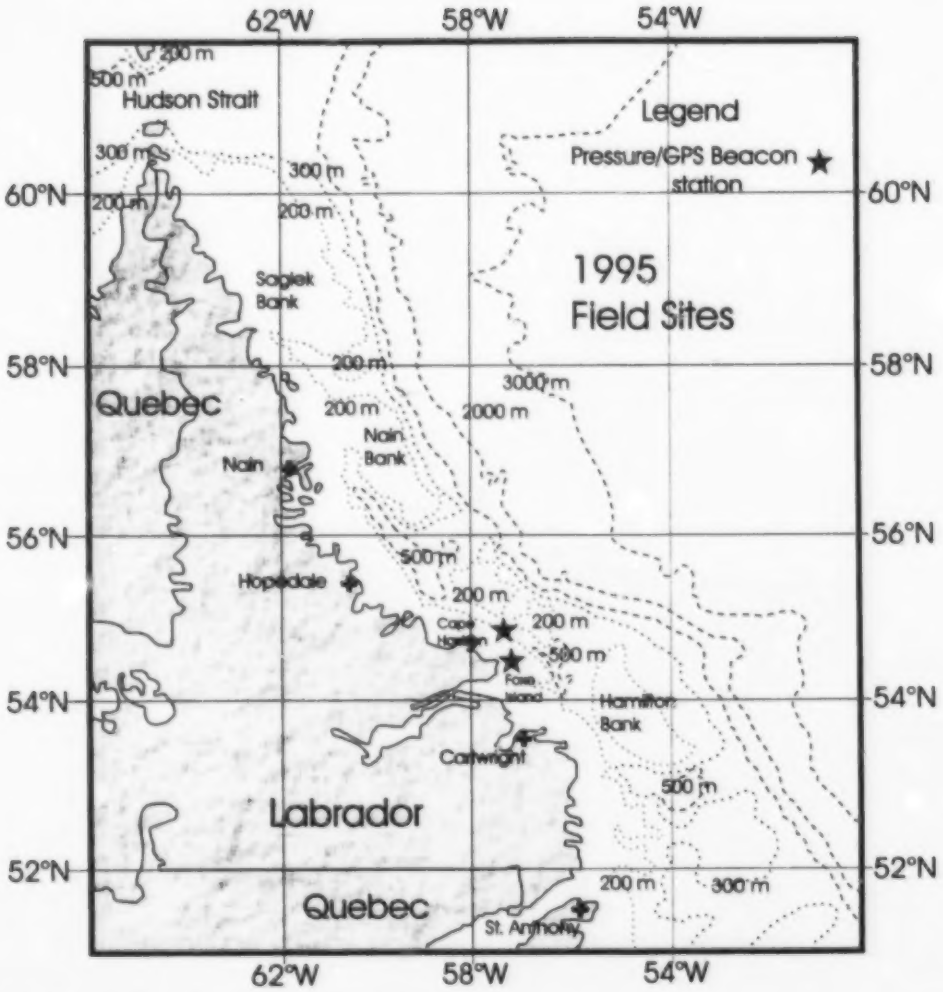



**Figure 7.1 1995 Labrador station locations**

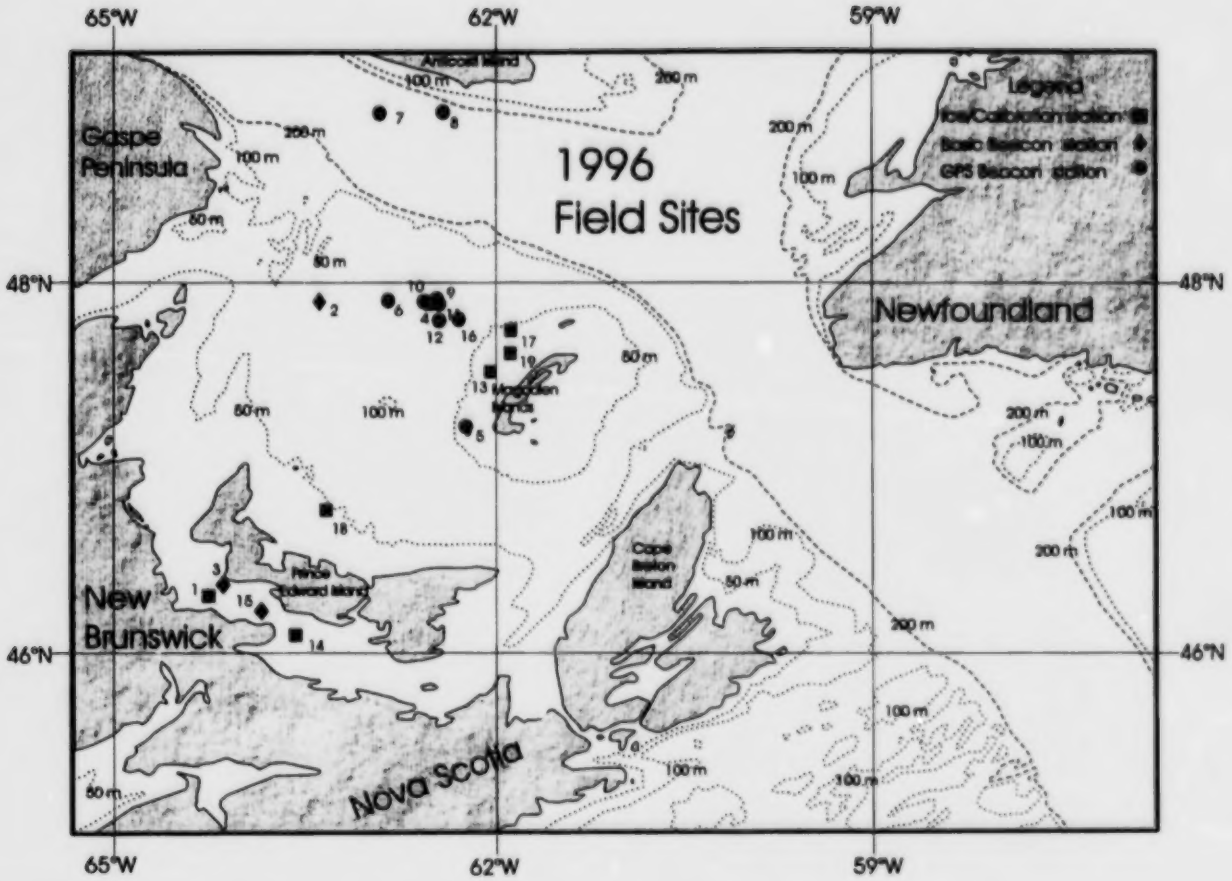



**Figure 7.2 1996 Gulf of St. Lawrence station locations**

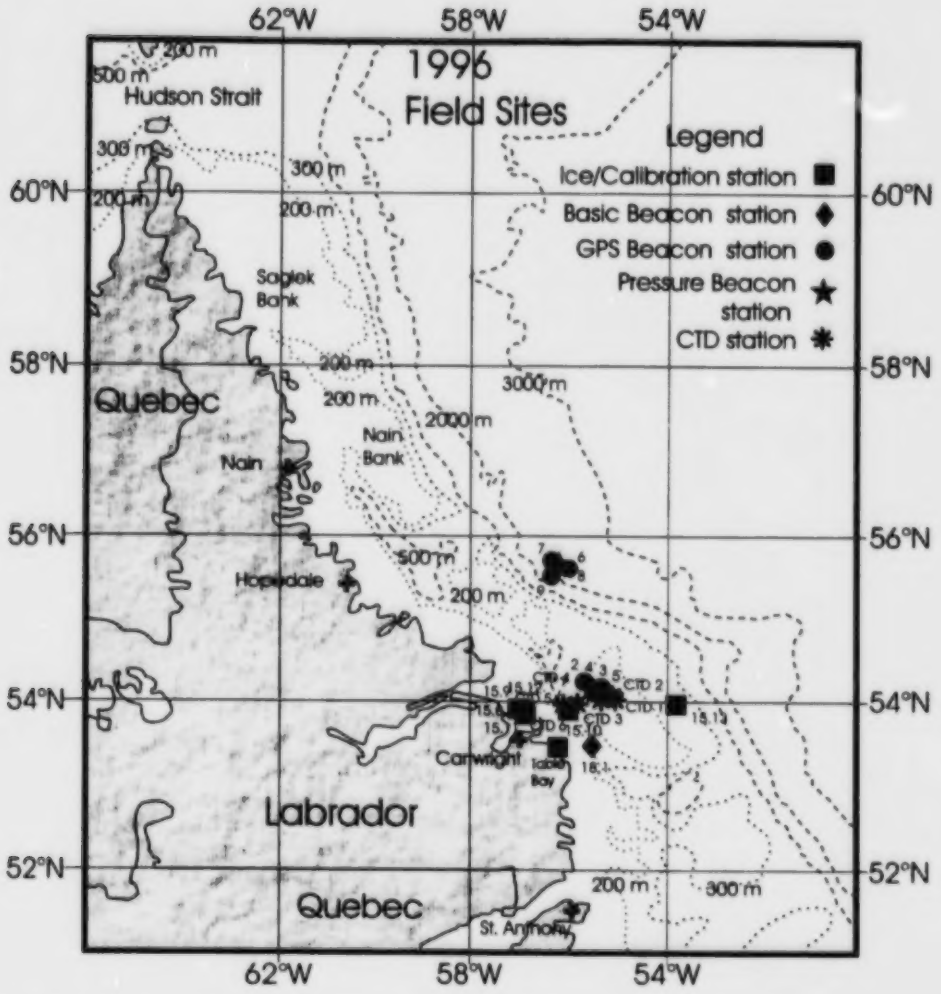



**Figure 7.3 1996 Labrador station locations**

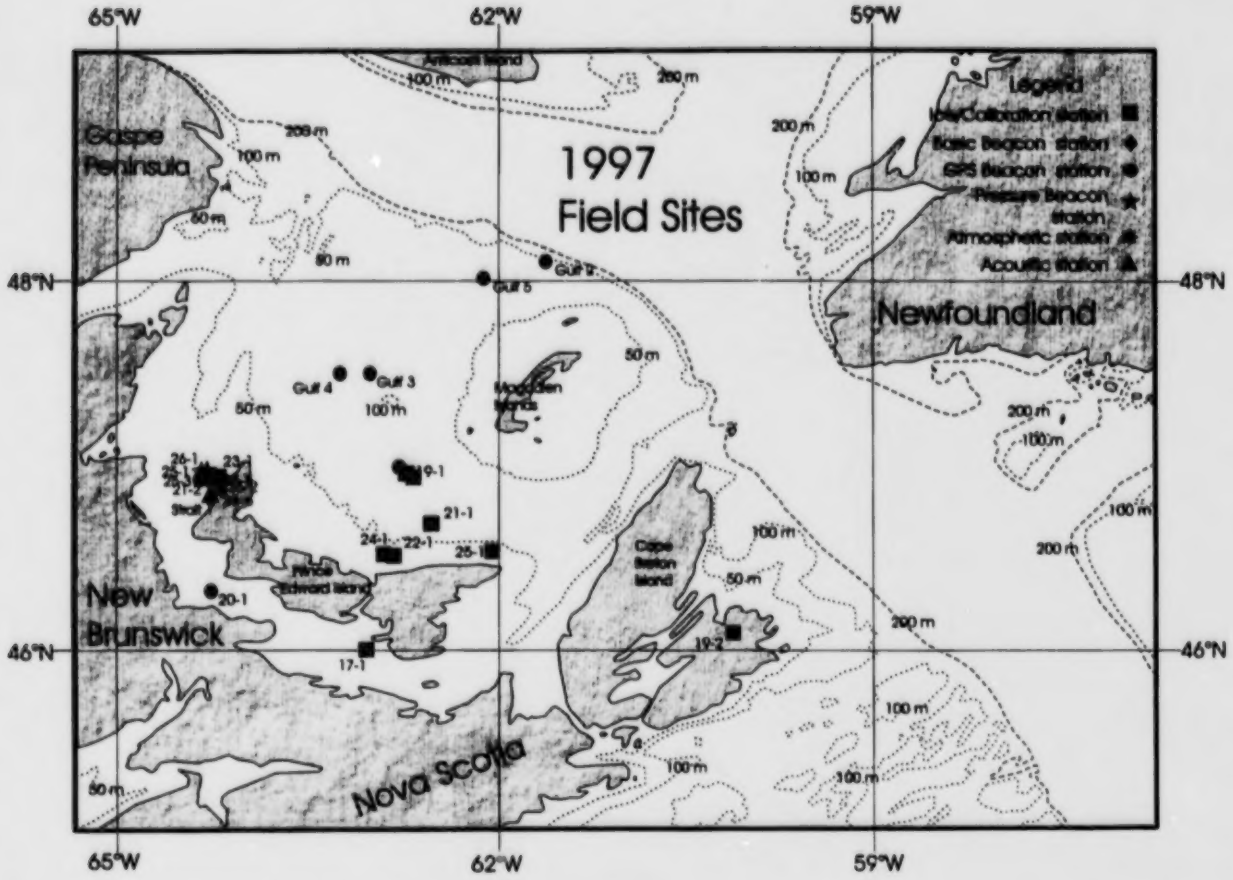



**Figure 7.4 1997 Gulf of St. Lawrence station locations**

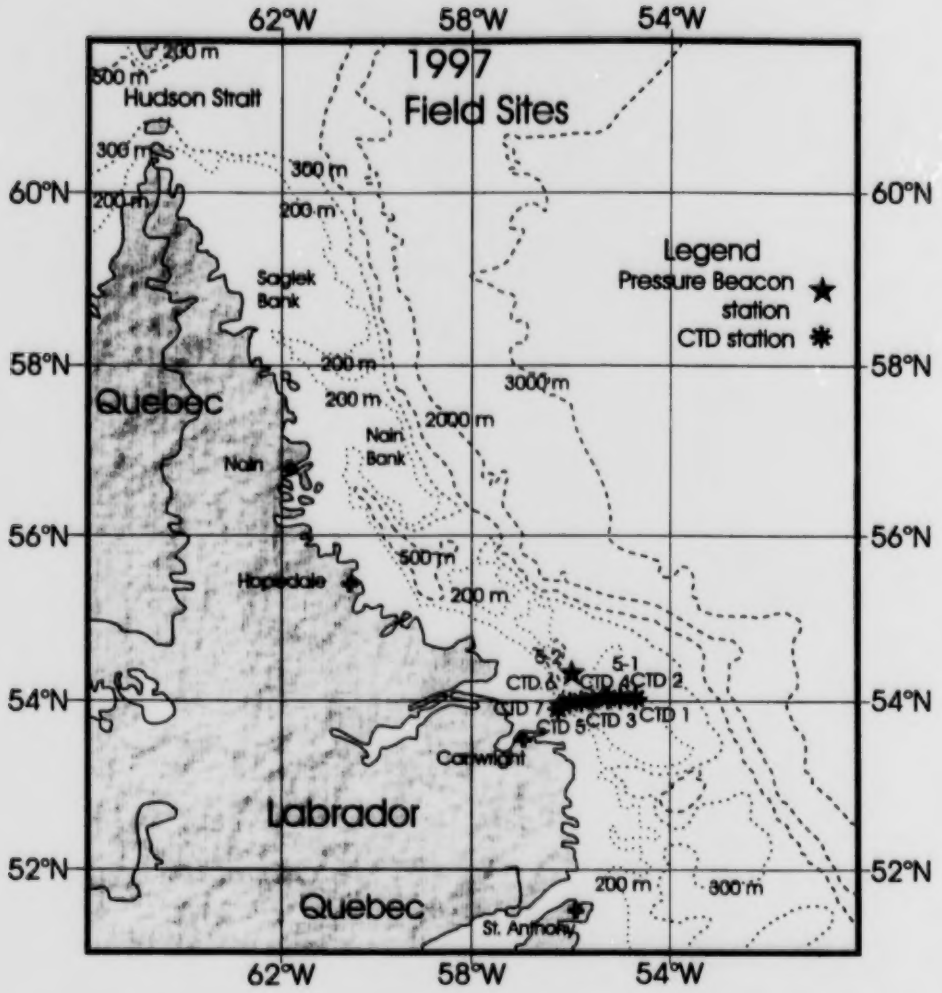



**Figure 7.5 1997 Labrador station locations**

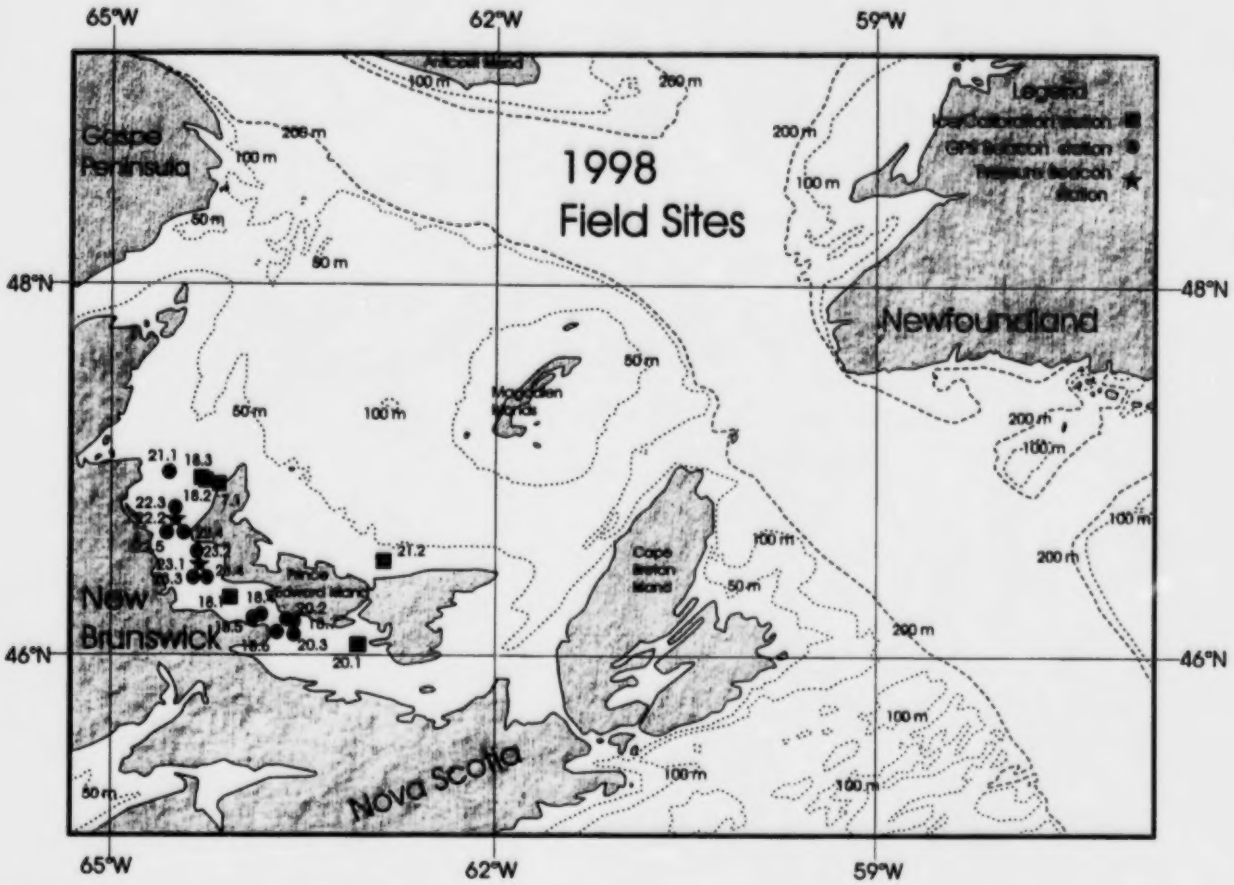



**Figure 7.6 1998 Gulf of St. Lawrence station locations**

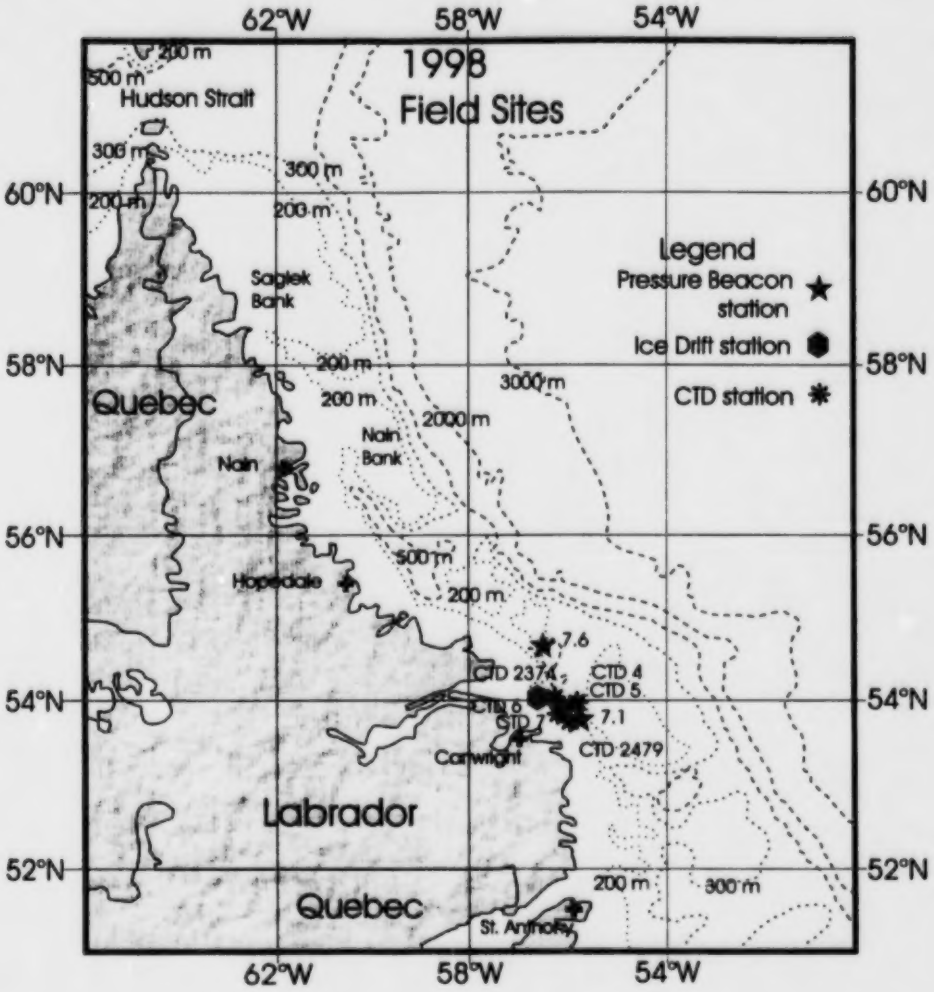
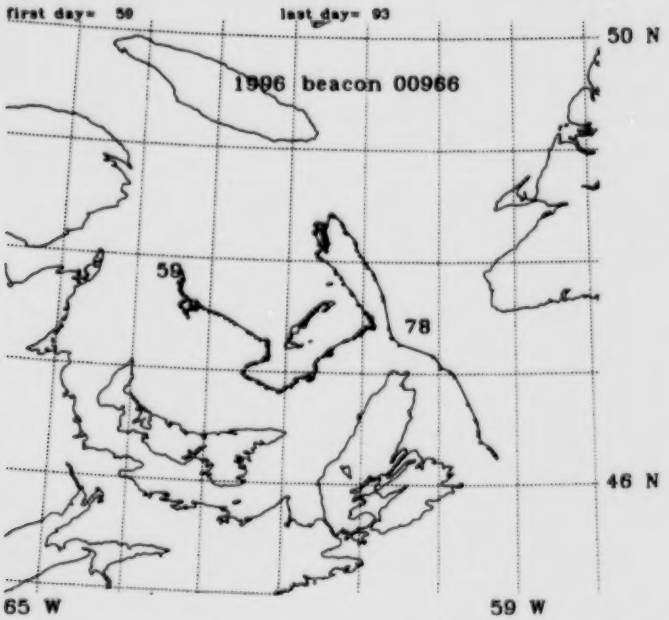



**Figure 7.7 1998 Labrador station locations**

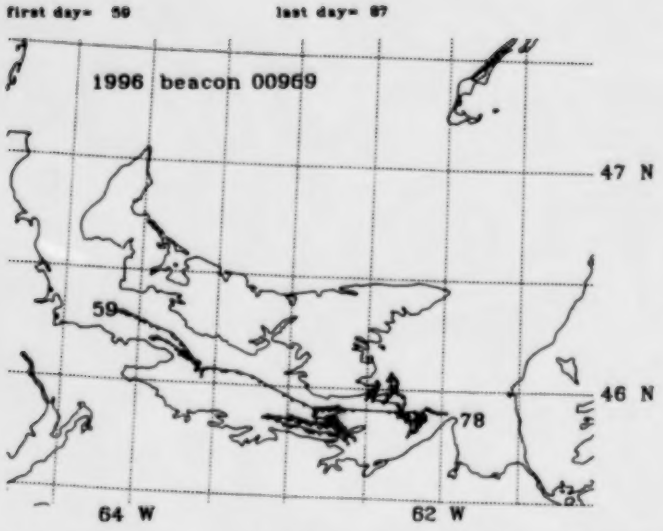
# 8 APPENDIX A: 1996 ARGOS BEACON TRACKS

## 8.1 Gulf of St. Lawrence



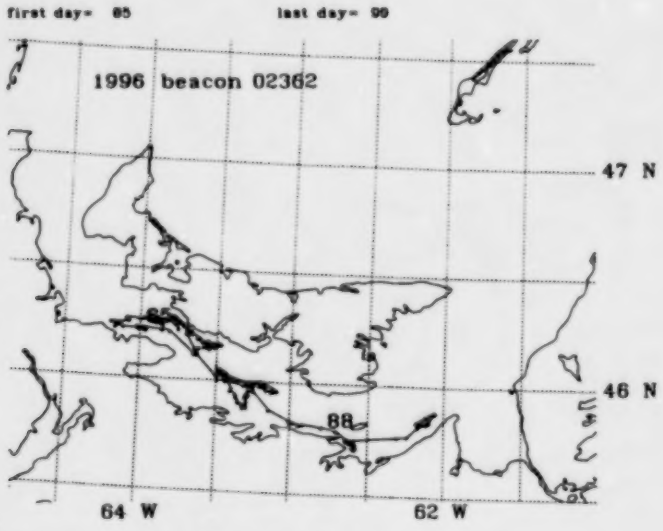

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 47.872°N | 63.386°W | day: 59.0056 |
| last reported ARGOS position: | 46.251°N | 59.244°W | day: 93.6621 |

**Figure 8.1.1 1996 beacon 966 trajectory**



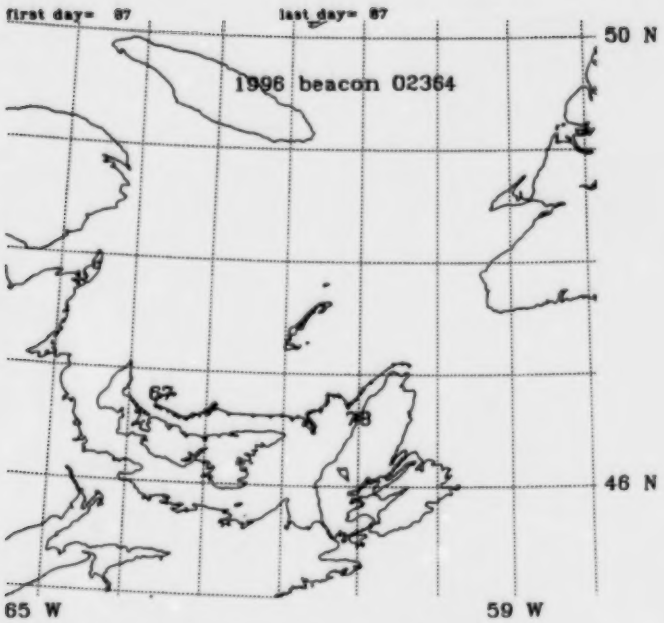

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 46.311°N | 64.137°W | day: 59.6428 |
| last reported ARGOS position: | 45.904°N | 61.965°W | day: 87.6397 |

**Figure 8.1.2 1996 beacon 969 trajectory**



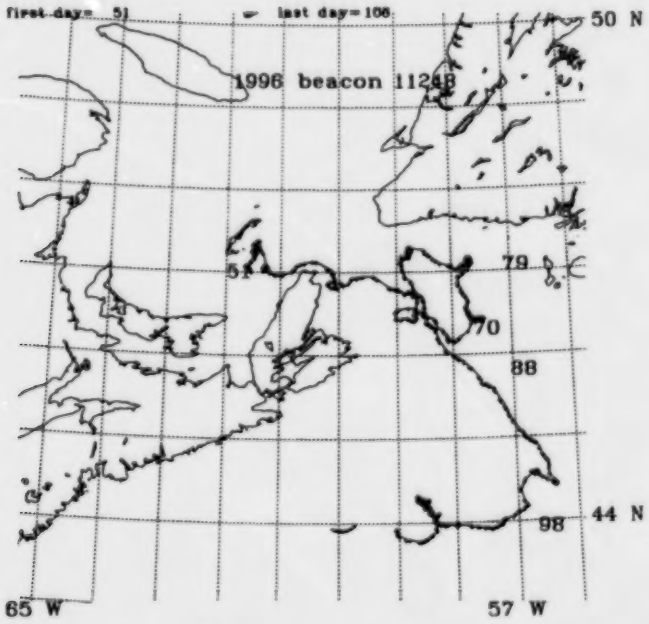

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 46.283°N | 63.797°W | day: 65.6655 |
| last reported ARGOS position: | 45.833°N | 62.165°W | day: 99.5352 |

**Figure 8.1.3 1996 beacon 2362 trajectory**



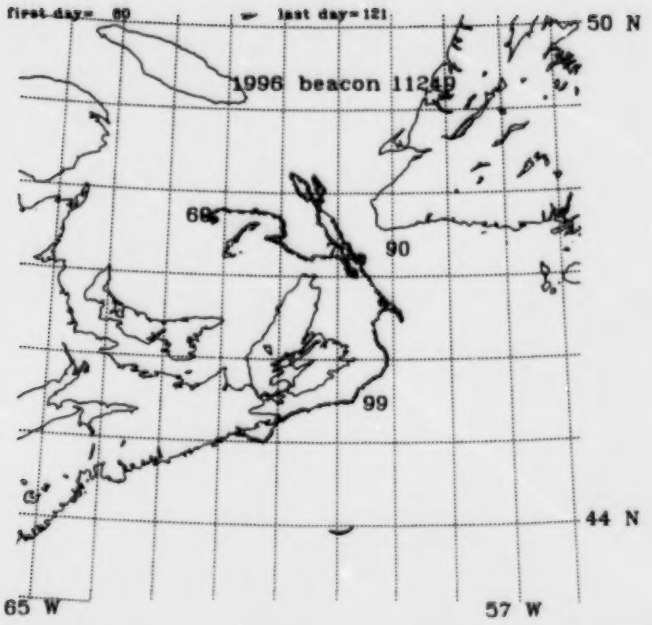

first reported ARGOS position: 46.787°N 63.403°W day: 67.7188
last reported ARGOS position: 47.093°N 60.373°W day: 87.5056

**Figure 8.1.4 1996 beacon 2364 trajectory**



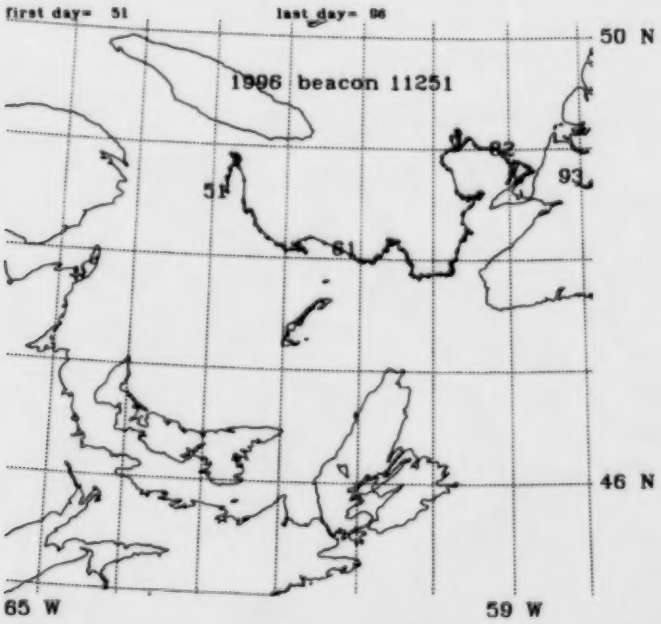

first reported ARGOS position: 47.009°N 61.527°W day: 51.2214
last reported ARGOS position: 43.934°N 59.034°W day: 106.776

**Figure 8.1.5 1996 beacon 11248 trajectory**



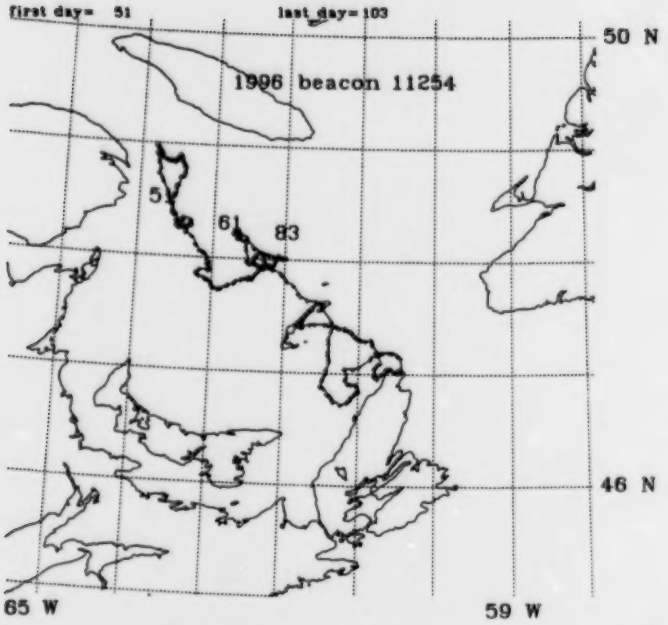

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 47.714°N | 62.241°W | day: 60.7031 |
| last reported ARGOS position: | 45.110°N | 61.658°W | day: 121.547 |

**Figure 8.1.6 1996 beacon 11249 trajectory**



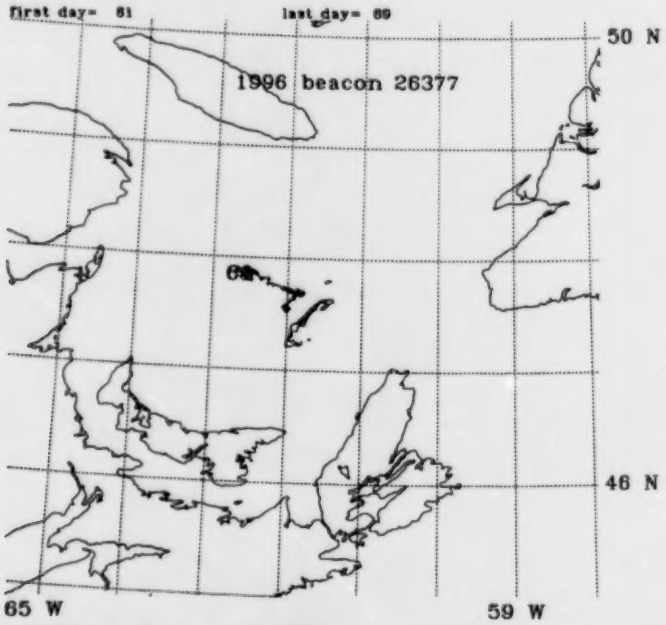

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 48.580°N | 62.785°W | day: 51.2212 |
| last reported ARGOS position: | 48.706°N | 59.025°W | day: 96.7827 |

**Figure 8.1.7 1996 beacon 11251 trajectory**



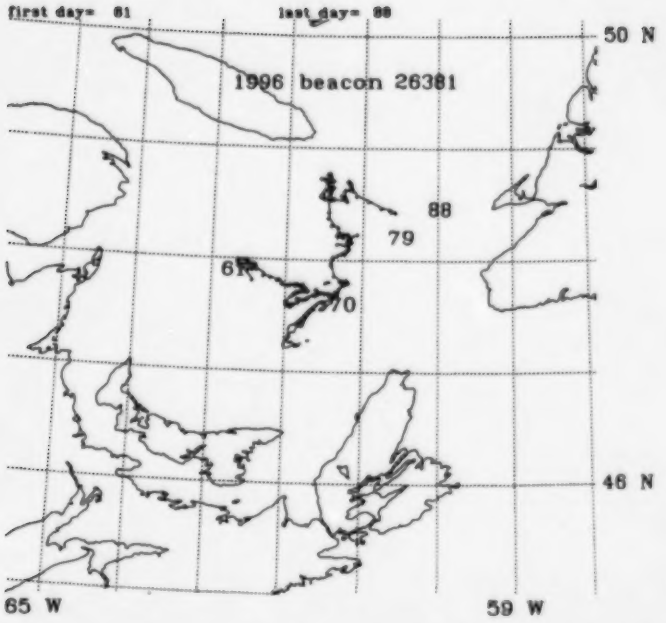

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 48.532°N | 63.531°W | day: 51.2214 |
| last reported ARGOS position: | 47.408°N | 61.751°W | day: 103.249 |

**Figure 8.1.8 1996 beacon 11254 trajectory**



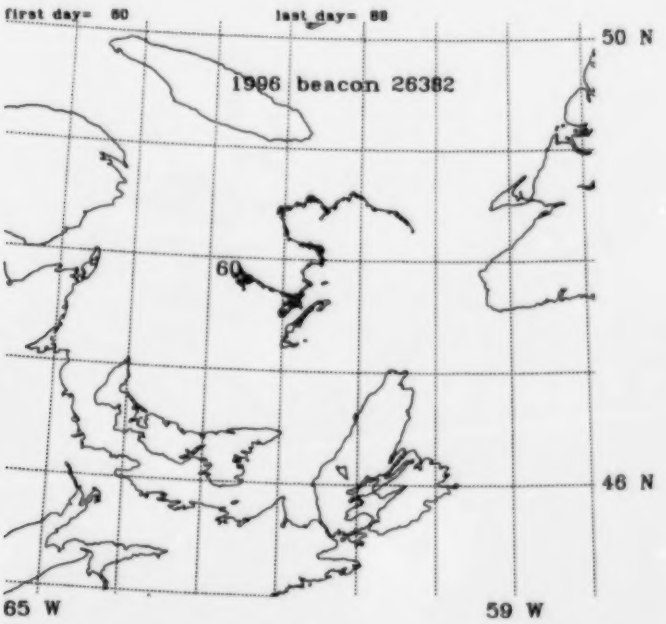

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 47.857°N | 62.490°W | day: 61.8228 |
| last reported ARGOS position: | 47.538°N | 62.004°W | day: 69.9783 |

**Figure 8.1.9 1996 beacon 26377 trajectory**



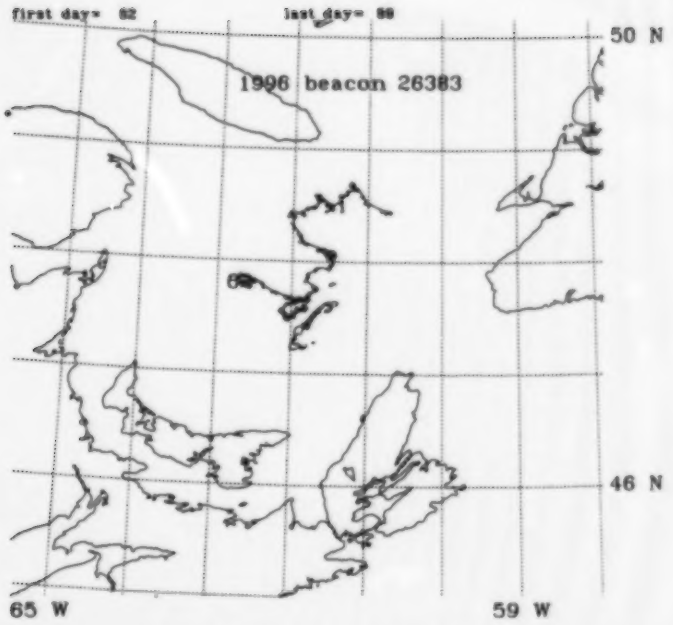

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 47.903°N | 62.531°W | day: 61.6958 |
| last reported ARGOS position: | 48.431°N | 60.576°W | day: 88.4915 |

**Figure 8.1.10 1996 beacon 26381 trajectory**



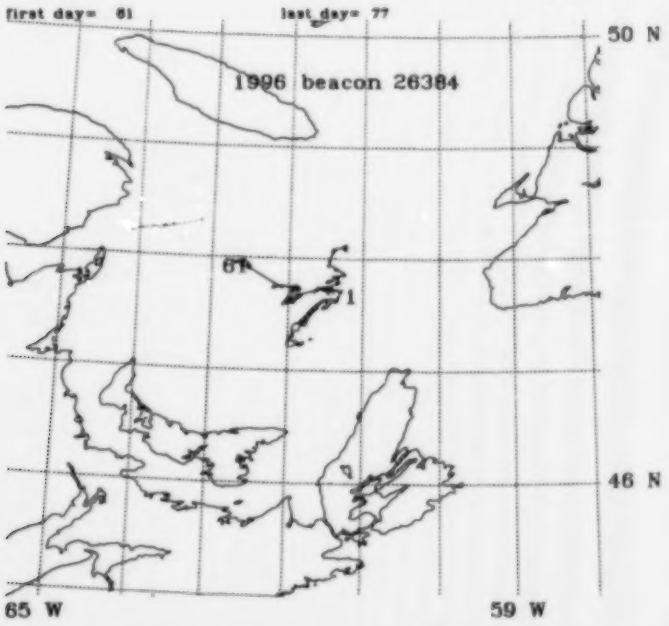

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 47.900°N | 62.574°W | day: 60.7029 |
| last reported ARGOS position: | 48.282°N | 60.315°W | day: 88.9692 |

**Figure 8.1.11 1996 beacon 26382 trajectory**



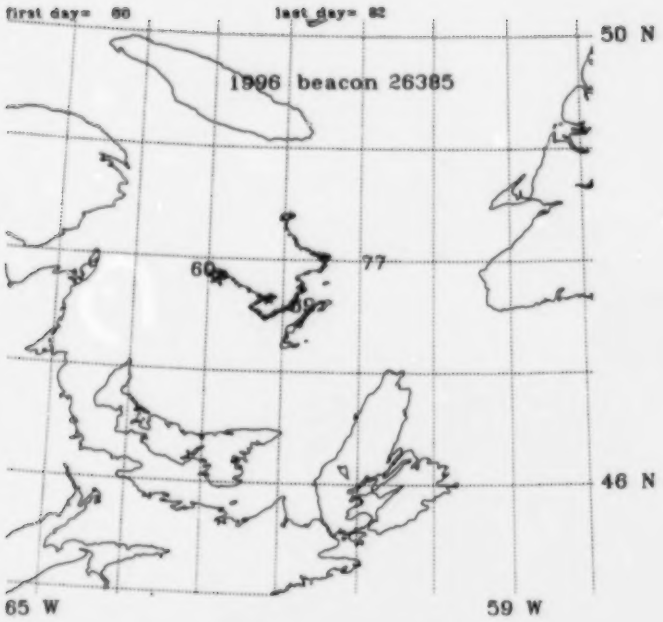

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 47.808°N | 62.533°W | day: 62.0303 |
| last reported ARGOS position: | 48.443°N | 60.750°W | day: 88.3618 |

**Figure 8.1.12 1996 beacon 26383 trajectory**



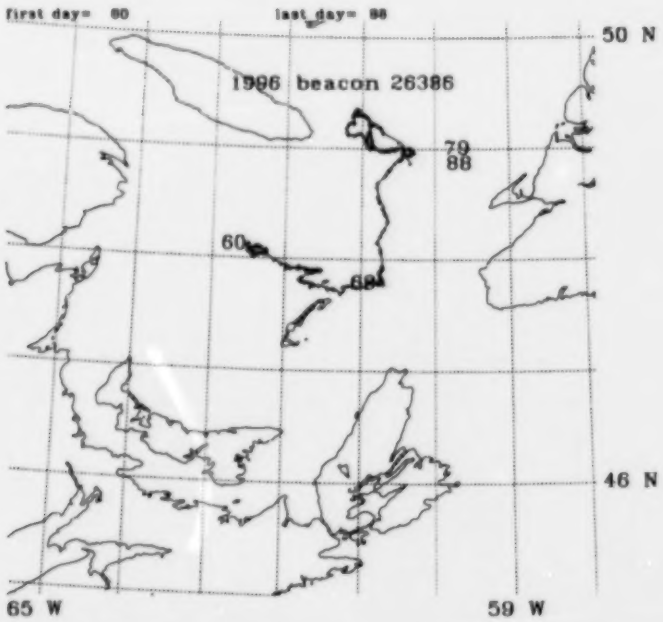

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 47.918°N | 62.524°W | day: 61.9617 |
| last reported ARGOS position: | 48.121°N | 61.232°W | day: 77.8577 |

**Figure 8.1.13 1996 beacon 26384 trajectory**



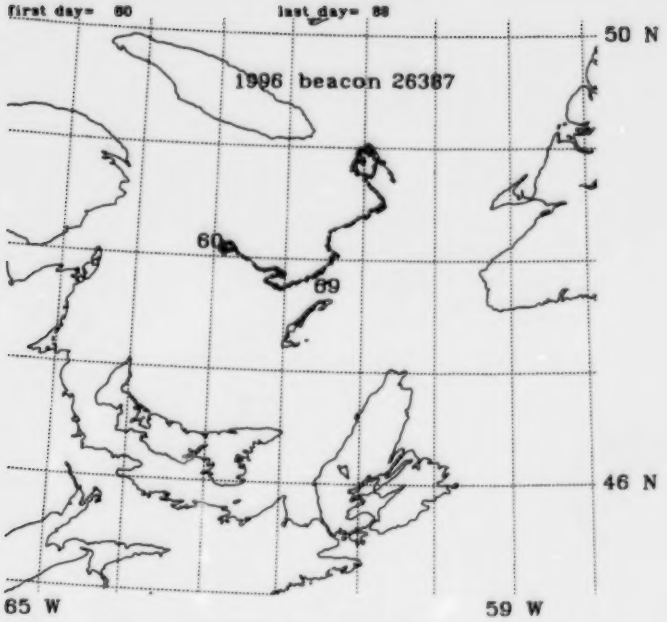

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 47.896°N | 62.902°W | day: 60.7732 |
| last reported ARGOS position: | 48.391°N | 61.914°W | day: 82.989 |

**Figure 8.1.14 1996 beacon 26385 trajectory**



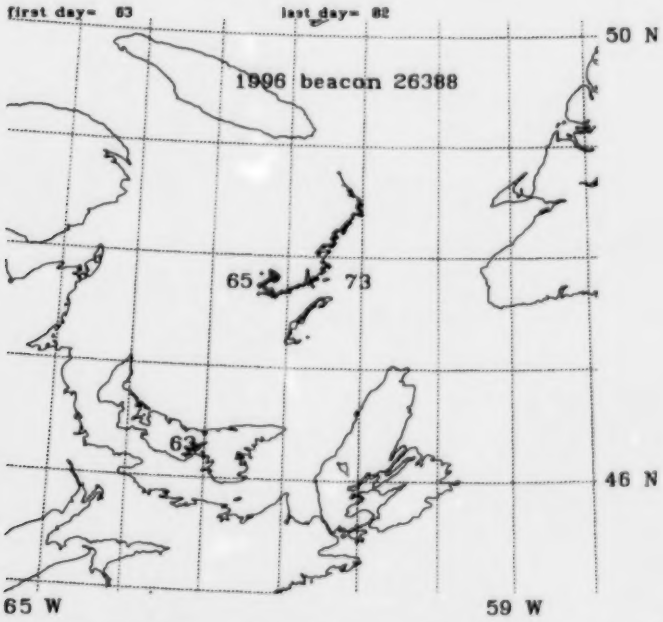

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 48.130°N | 62.526°W | day: 60.8377 |
| last reported ARGOS position: | 48.873°N | 60.344°W | day: 88.7017 |

**Figure 8.1.15 1996 beacon 26386 trajectory**




first reported ARGOS position: 48.136°N 62.881°W day: 60.905
last reported ARGOS position: 48.718°N 60.574°W day: 88.5613

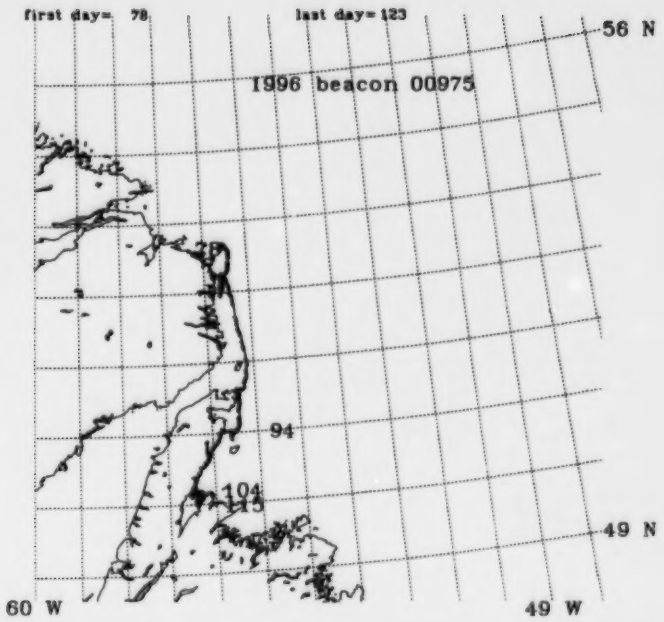
**Figure 8.1.16 1996 beacon 26387 trajectory**




first reported ARGOS position: 46.298°N 62.099°W day: 63.6809
last reported ARGOS position: 48.774°N 61.330°W day: 82.1975

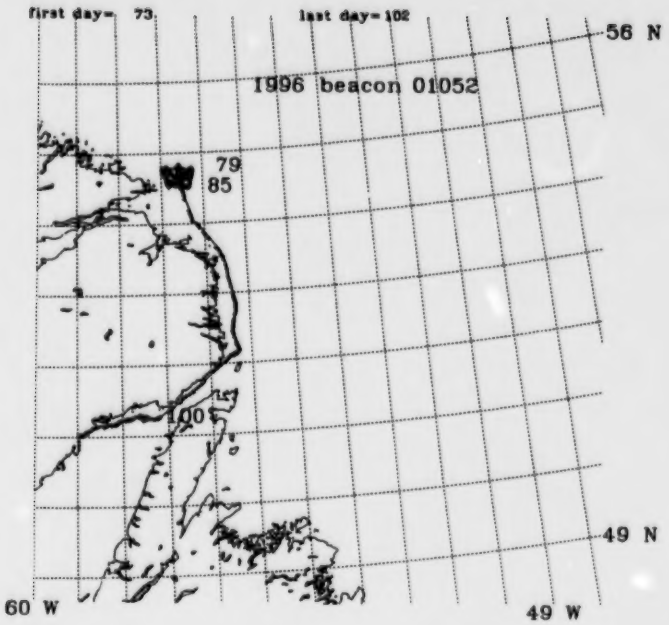
**Figure 8.1.17 1996 beacon 26388 trajectory**

## 8.2 Labrador



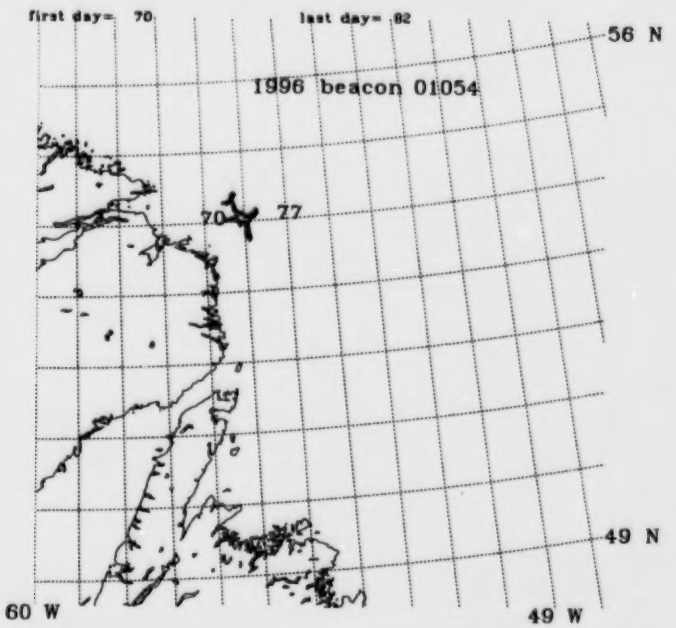

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 53.608°N | 55.555°W | day: 78.6397 |
| last reported ARGOS position: | 50.021°N | 56.073°W | day: 123.717 |

**Figure 8.2.1 1996 beacon 975 trajectory**



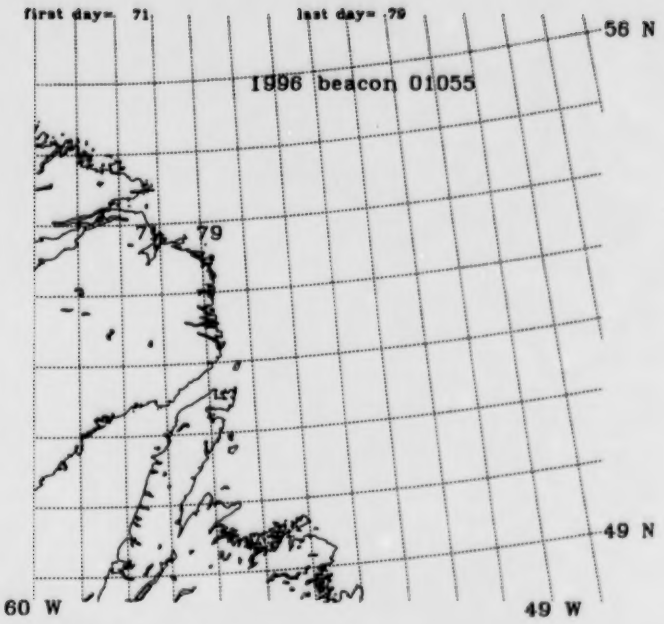

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 54.686°N | 56.356°W | day: 73.8181 |
| last reported ARGOS position: | 51.147°N | 58.392°W | day: 102.326 |

**Figure 8.2.2 1996 beacon 1052 trajectory**



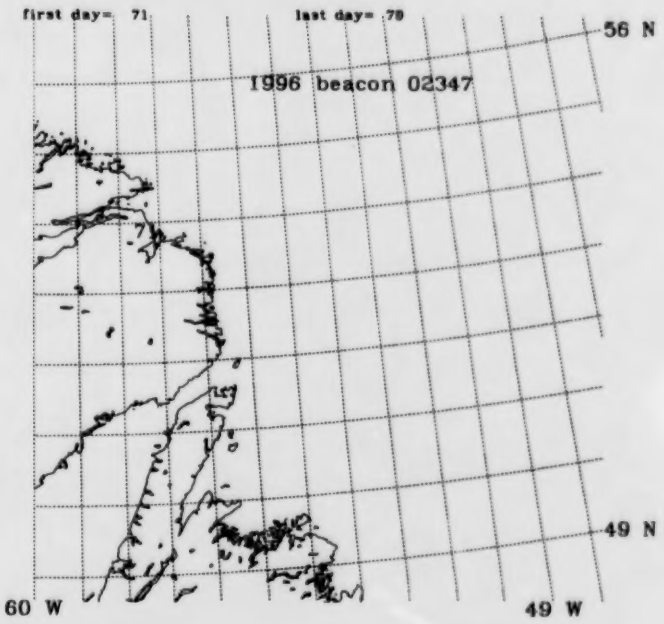

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 53.687°N | 57.015°W | day: 70.5569 |
| last reported ARGOS position: | 54.284°N | 55.514°W | day: 82.196 |

**Figure 8.2.3 1996 beacon 1054 trajectory**



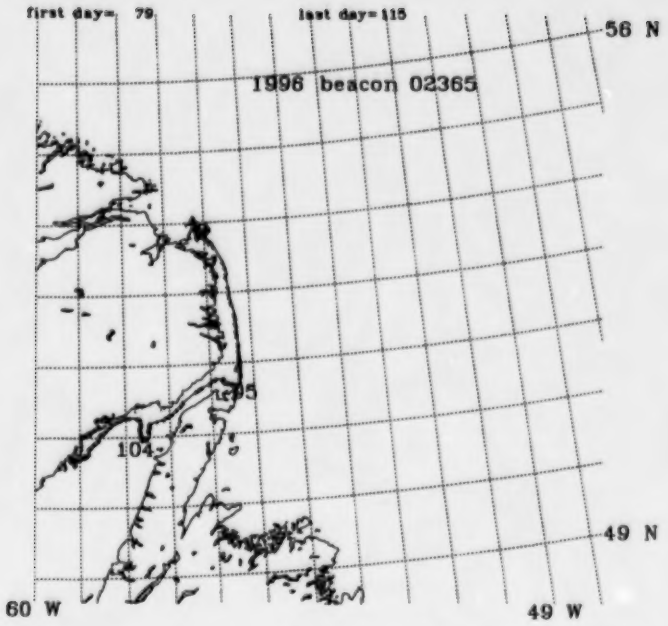

first reported ARGOS position: 53.874°N 56.983°W day: 71.8115
last reported ARGOS position: 53.867°N 56.988°W day: 79.6311

**Figure 8.2.4 1996 beacon 1055 trajectory**



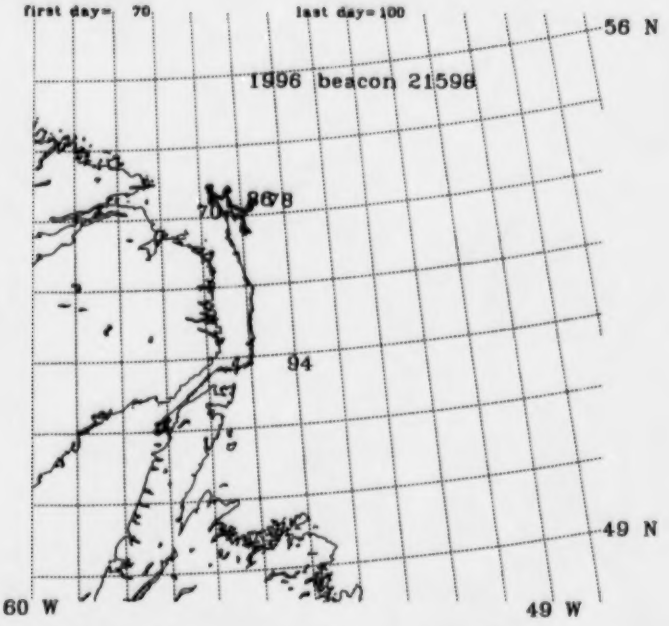

first reported ARGOS position: 53.871°N 57.004°W day: 71.95
last reported ARGOS position: 53.871°N 56.987°W day: 79.6299

**Figure 8.2.5 1996 beacon 2347 trajectory**



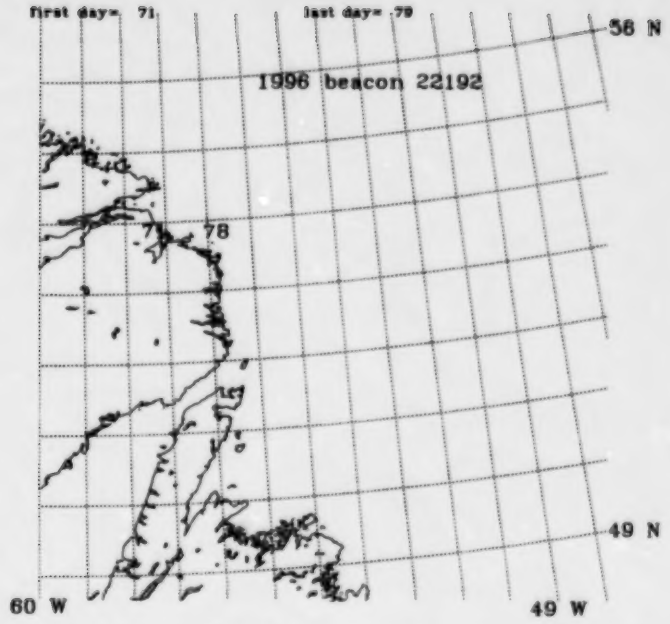

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 53.884°N | 55.873°W | day: 79.6306 |
| last reported ARGOS position: | 50.606°N | 59.102°W | day: 115.366 |

**Figure 8.2.6 1996 beacon 2365 trajectory**



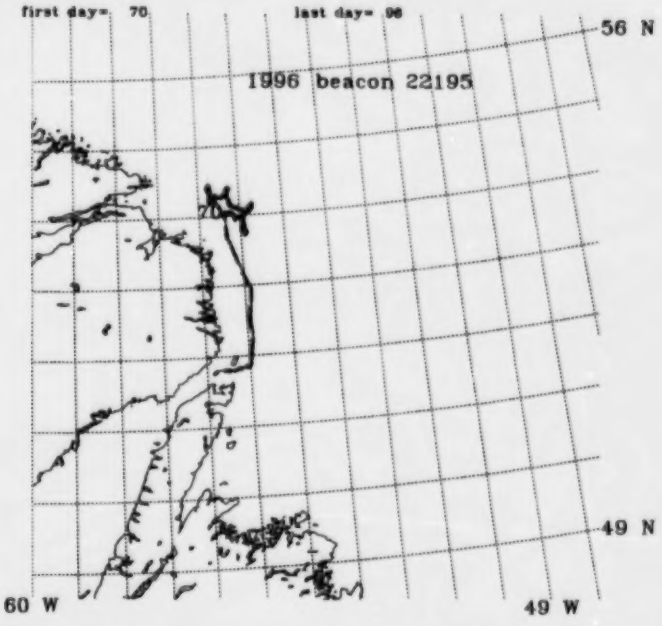

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 54.060°N | 55.473°W | day: 70.9617 |
| last reported ARGOS position: | 51.178°N | 56.952°W | day: 100.753 |

**Figure 8.2.7 1996 beacon 21598 trajectory**



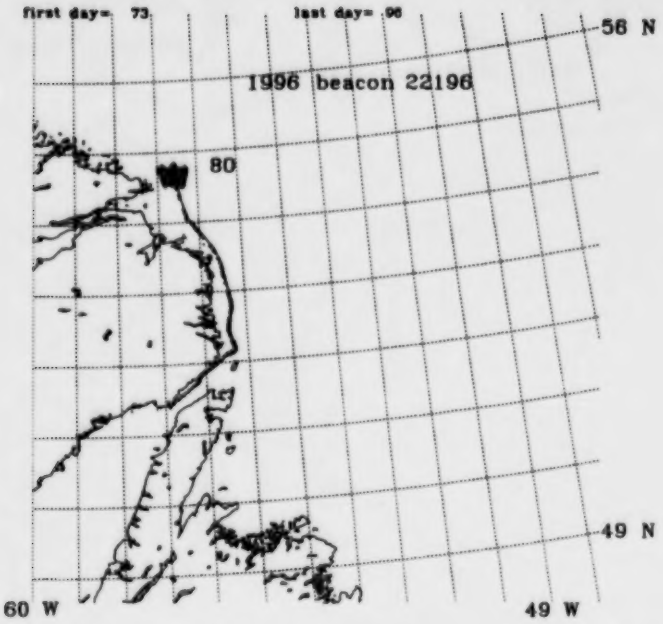

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 53.872°N | 56.979°W | day: 71.8113 |
| last reported ARGOS position: | 53.867°N | 56.983°W | day: 79.5579 |

**Figure 8.2.8 1996 beacon 22192 trajectory**



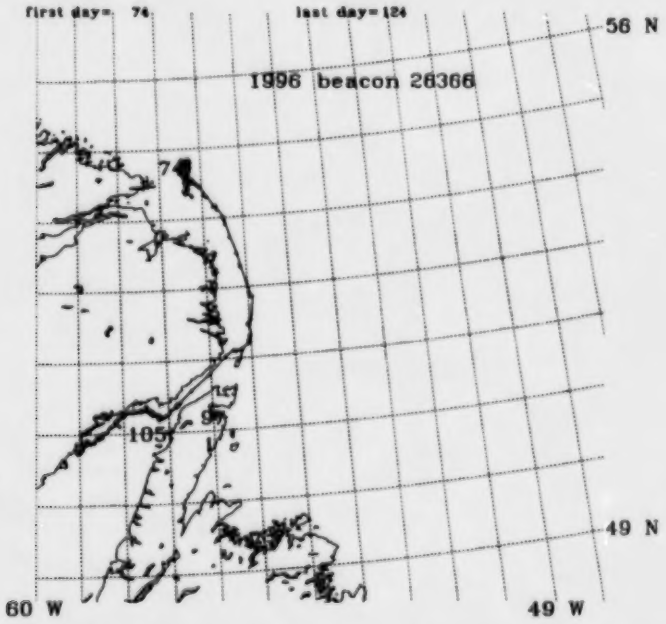

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 53.685°N | 57.024°W | day: 70.6304 |
| last reported ARGOS position: | 51.777°N | 55.819°W | day: 96.4395 |

**Figure 8.2.9 1996 beacon 22195 trajectory**



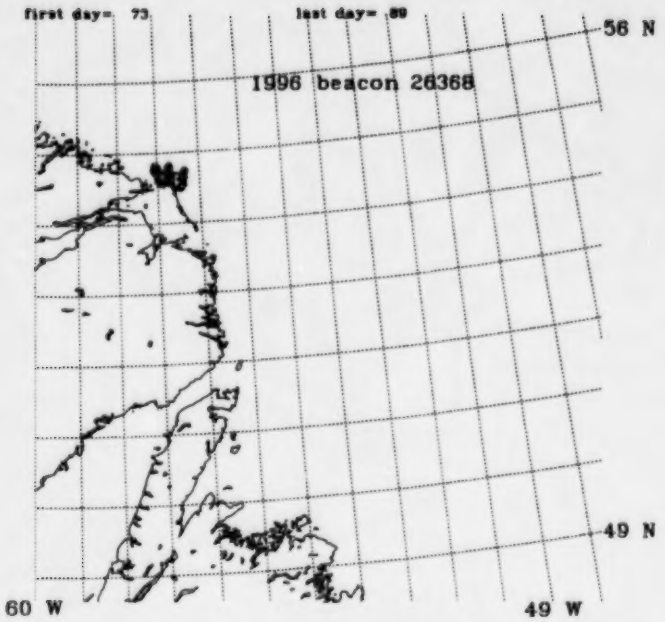

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 54.671°N | 56.318°W | day: 73.8494 |
| last reported ARGOS position: | 51.410°N | 56.880°W | day: 96.9873 |

**Figure 8.2.10 1996 beacon 22196 trajectory**



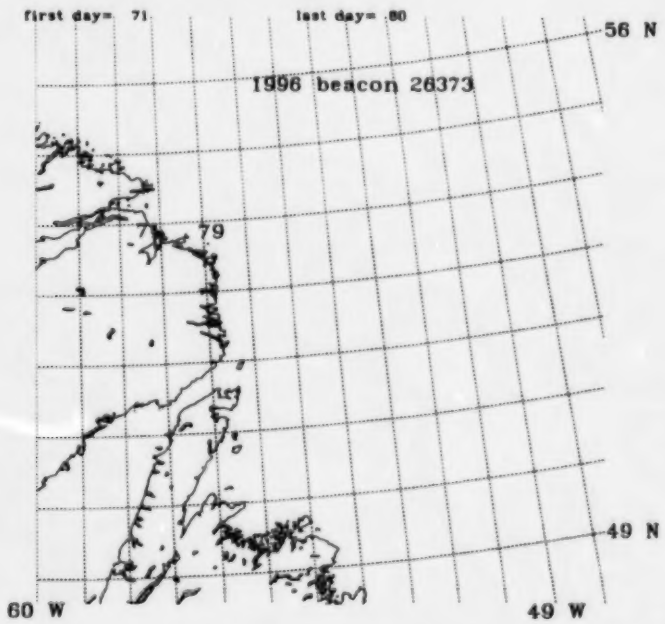

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 54.723°N | 56.364°W | day: 74.1858 |
| last reported ARGOS position: | 50.781°N | 59.054°W | day: 124.298 |

**Figure 8.2.11 1996 beacon 26366 trajectory**



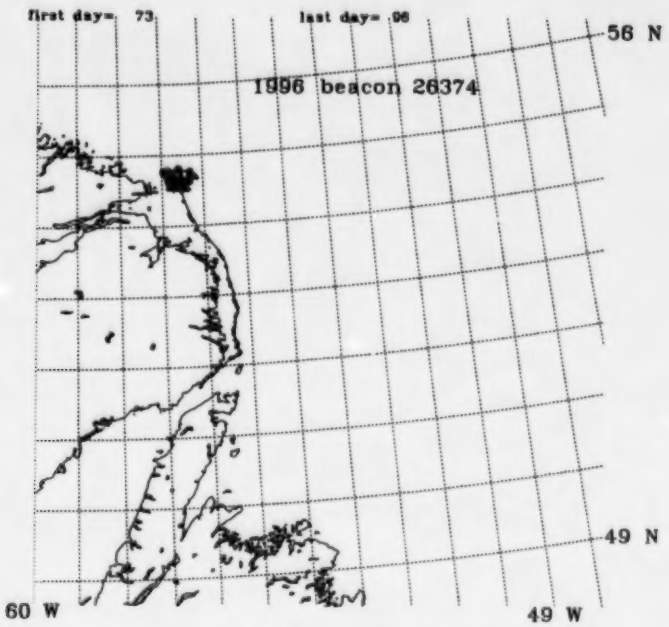

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 54.605°N | 56.387°W | day: 73.9883 |
| last reported ARGOS position: | 53.901°N | 56.116°W | day: 89.8831 |

**Figure 8.2.12 1996 beacon 26368 trajectory**



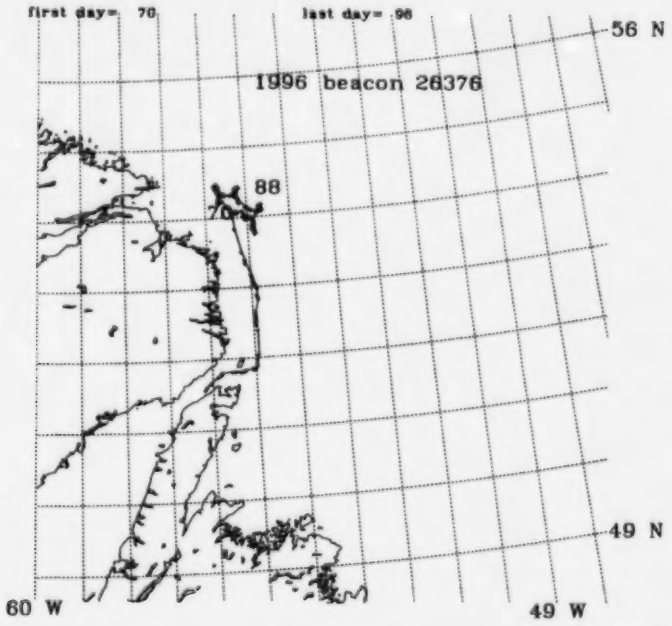

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 53.895°N | 56.964°W | day: 71.8115 |
| last reported ARGOS position: | 53.692°N | 57.003°W | day: 80.4028 |

**Figure 8.2.13 1996 beacon 26373 trajectory**



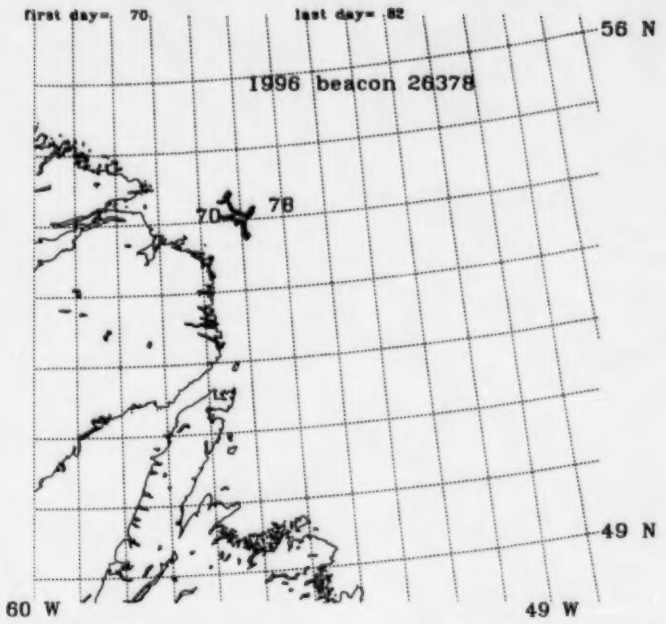

first reported ARGOS position: 54.670°N 56.288°W day: 73.9207
last reported ARGOS position: 51.730°N 56.263°W day: 96.2998

**Figure 8.2.14 1996 beacon 26374 trajectory**



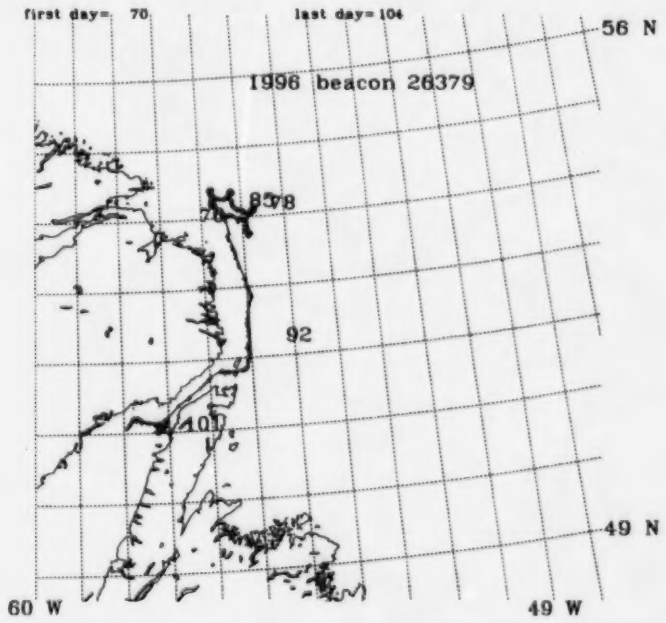

first reported ARGOS position: 54.065°N 55.319°W day: 70.9646
last reported ARGOS position: 51.576°N 56.175°W day: 96.8481

**Figure 8.2.15 1996 beacon 26376 trajectory**




first reported ARGOS position: 54.075°N 55.475°W day: 70.8242
last reported ARGOS position: 54.281°N 55.513°W day: 82.1963

**Figure 8.2.16 1996 beacon 26378 trajectory**

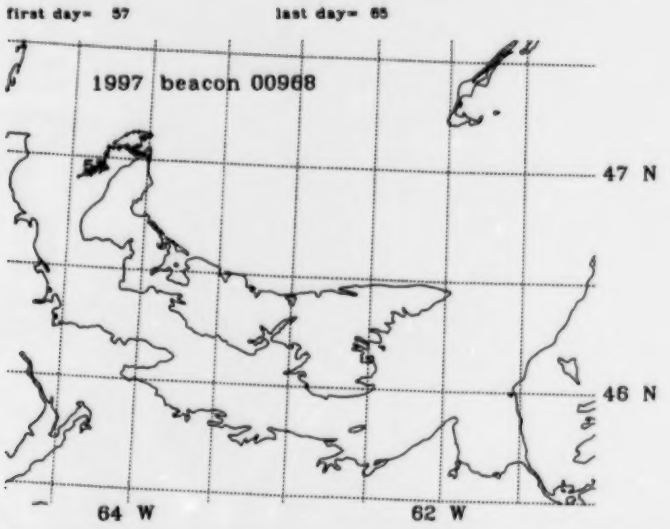



first reported ARGOS position: 54.037°N 55.406°W day: 70.9644
last reported ARGOS position: 51.088°N 57.918°W day: 104.72

**Figure 8.2.17 1996 beacon 26379 trajectory**

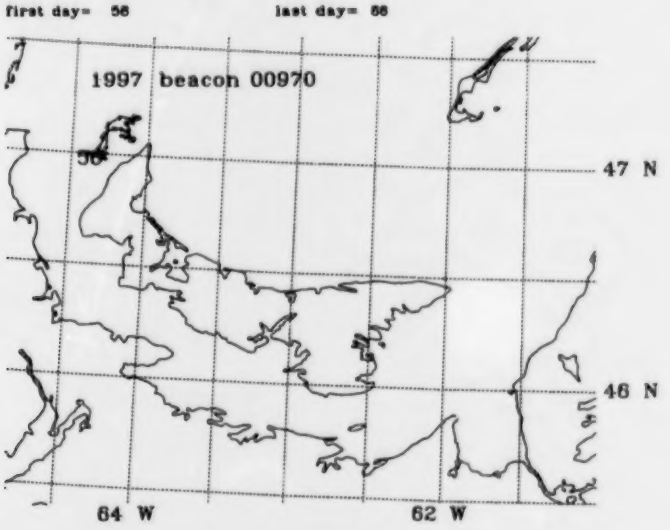
# 9 APPENDIX B: 1997 ARGOS BEACON TRACKS

## 9.1 Gulf of St. Lawrence



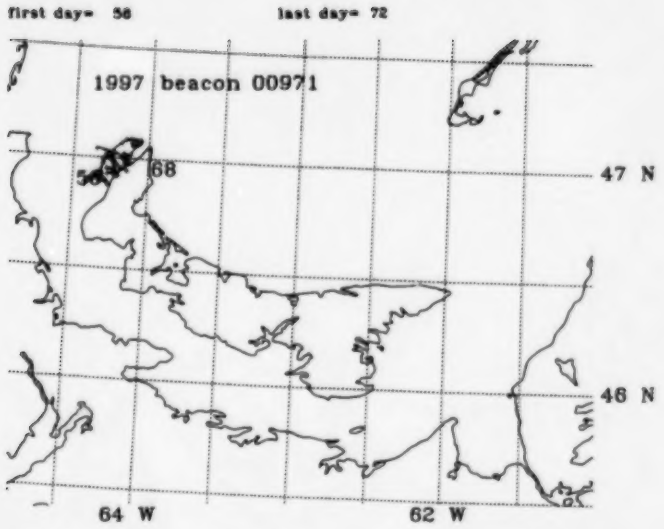

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 46.956°N | 63.733°W | day: 57.8855 |
| last reported ARGOS position: | 47.072°N | 63.746°W | day: 65.9739 |

**Figure 9.1.1 1997 beacon 968 trajectory**



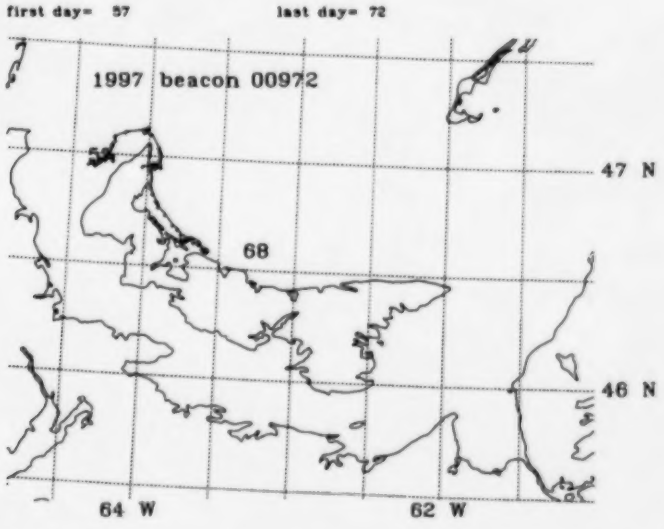

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 46.982°N | 64.291°W | day: 56.9031 |
| last reported ARGOS position: | 47.034°N | 64.268°W | day: 66.2766 |

**Figure 9.1.2 1997 beacon 970 trajectory**



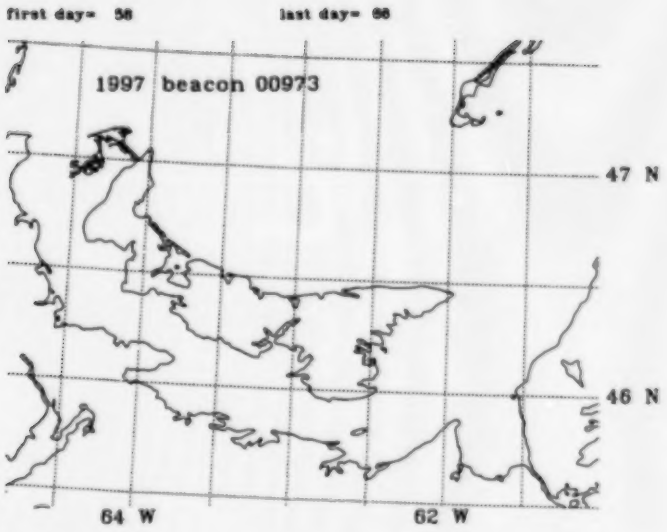

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 46.903°N | 64.304°W | day: 56.8994 |
| last reported ARGOS position: | 46.948°N | 64.137°W | day: 72.7075 |

**Figure 9.1.3 1997 beacon 971 trajectory**



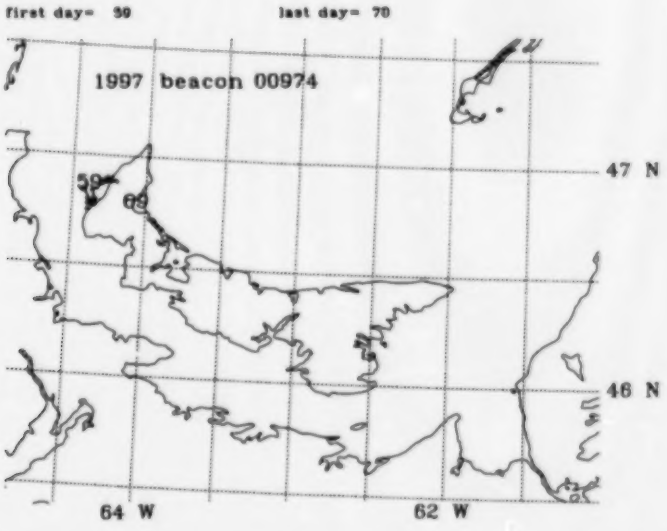

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 46.992°N | 63.714°W | day: 57.886 |
| last reported ARGOS position: | 46.613°N | 63.738°W | day: 72.23 |

**Figure 9.1.4 1997 beacon 972 trajectory**



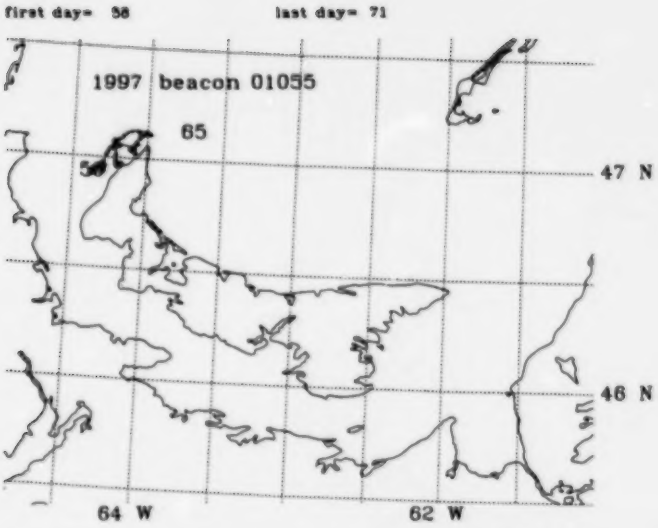

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 46.952°N | 64.365°W | day: 56.9717 |
| last reported ARGOS position: | 46.988°N | 64.312°W | day: 66.2754 |

**Figure 9.1.5 1997 beacon 973 trajectory**



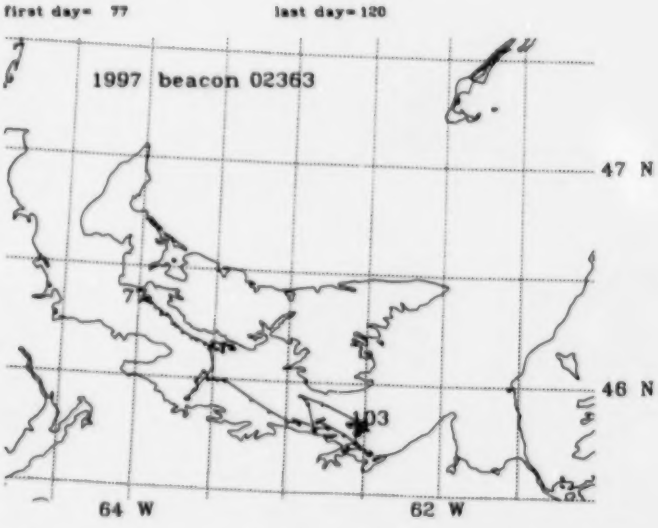

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 46.876°N | 63.161°W | day: 59.6675 |
| last reported ARGOS position: | 46.865°N | 64.404°W | day: 70.7957 |

**Figure 9.1.6 1997 beacon 974 trajectory**



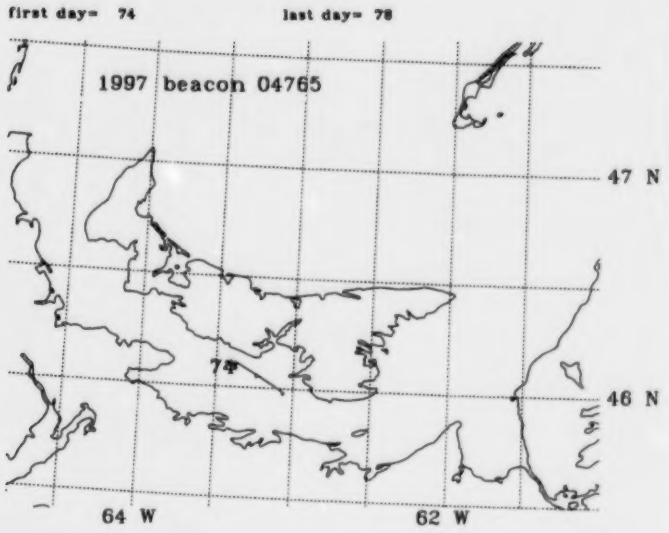

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 46.941°N | 64.279°W | day: 56.761 |
| last reported ARGOS position: | 47.079°N | 64.200°W | day: 71.5447 |

**Figure 9.1.7 1997 beacon 1055 trajectory**



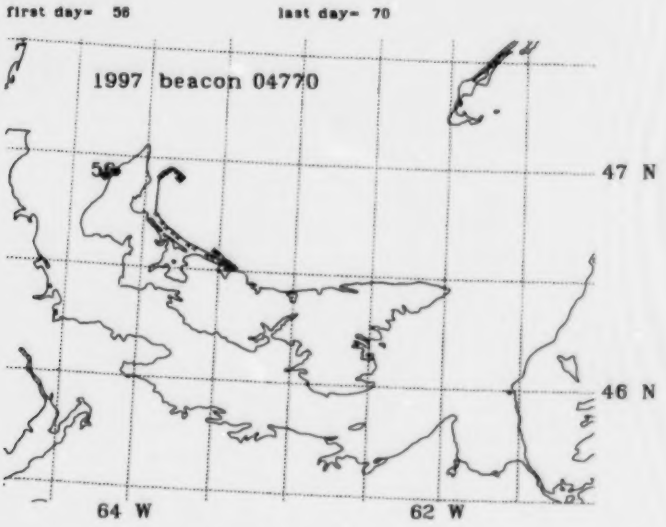

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 46.358°N | 63.938°W | day: 77.5232 |
| last reported ARGOS position: | 45.776°N | 62.809°W | day: 120.354 |

**Figure 9.1.8 1997 beacon 2363 trajectory**



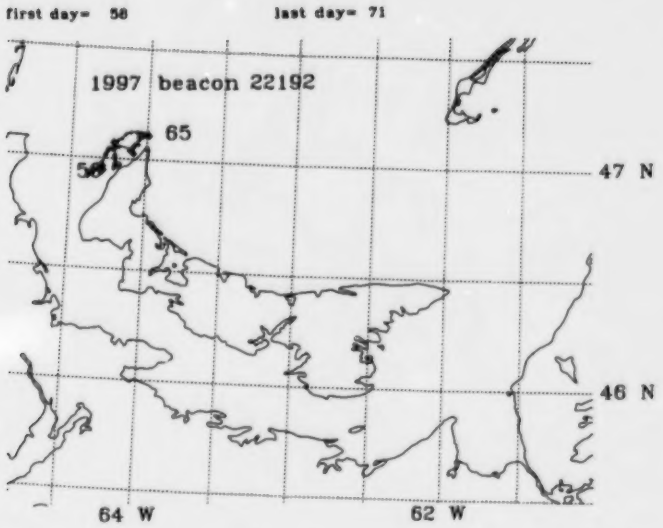

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 46.091°N | 63.371°W | day: 74.2778 |
| last reported ARGOS position: | 45.983°N | 63.064°W | day: 78.9792 |

**Figure 9.1.9 1997 beacon 4765 trajectory**



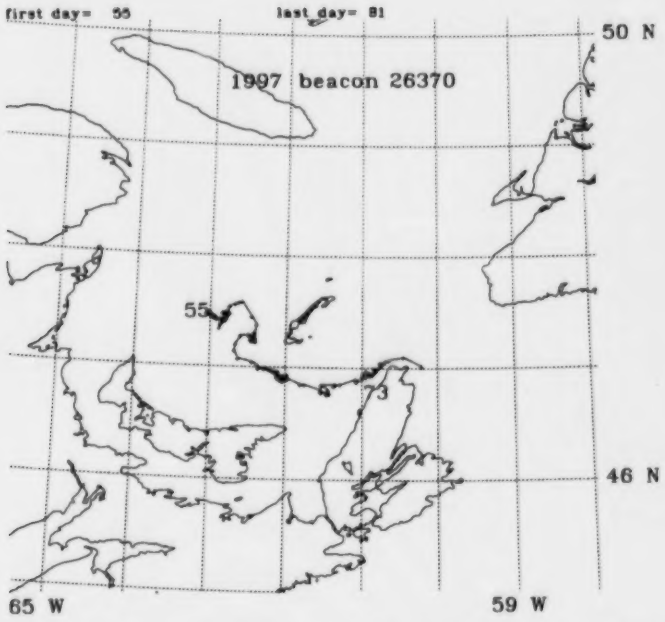

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 46.932°N | 64.202°W | day: 56.8323 |
| last reported ARGOS position: | 46.598°N | 63.536°W | day: 70.4182 |

**Figure 9.1.10 1997 beacon 4770 trajectory**



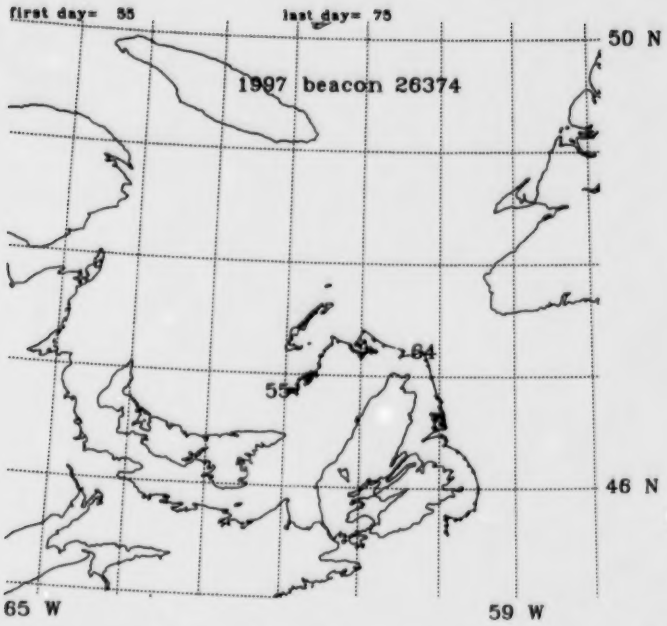

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 46.941°N | 64.286°W | day: 56.7581 |
| last reported ARGOS position: | 47.071°N | 64.200°W | day: 71.5457 |

**Figure 9.1.11 1997 beacon 22192 trajectory**



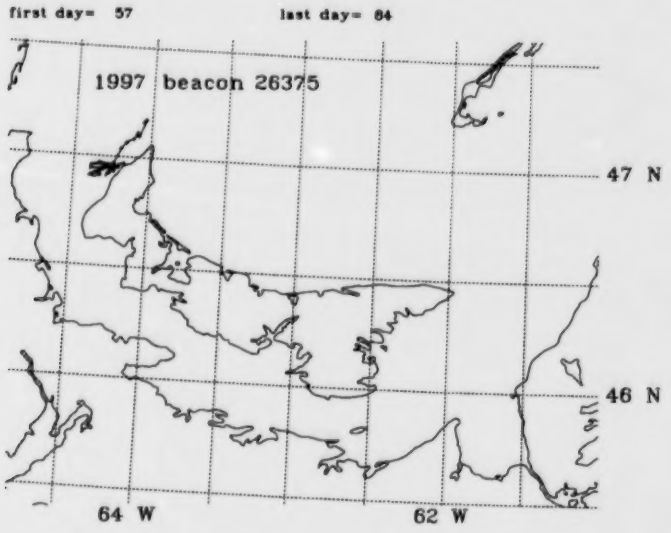

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 47.491°N | 63.010°W | day: 55.8474 |
| last reported ARGOS position: | 47.021°N | 60.203°W | day: 81.5317 |

**Figure 9.1.12 1997 beacon 26370 trajectory**



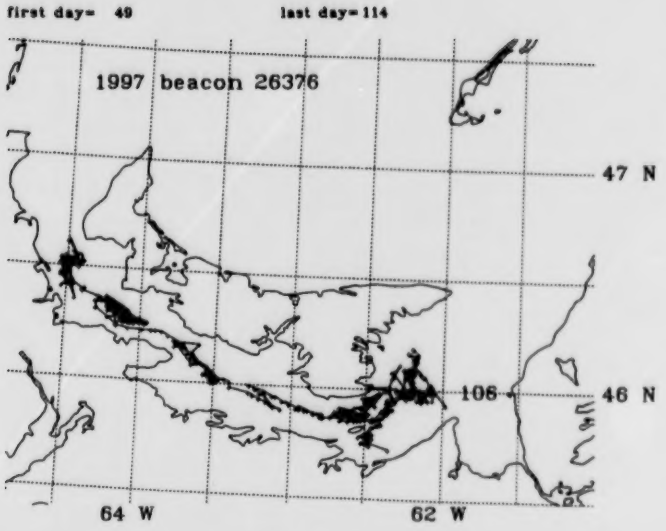

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 46.848°N | 61.925°W | day: 55.6982 |
| last reported ARGOS position: | 45.603°N | 59.880°W | day: 75.8906 |

**Figure 9.1.13 1997 beacon 26374 trajectory**



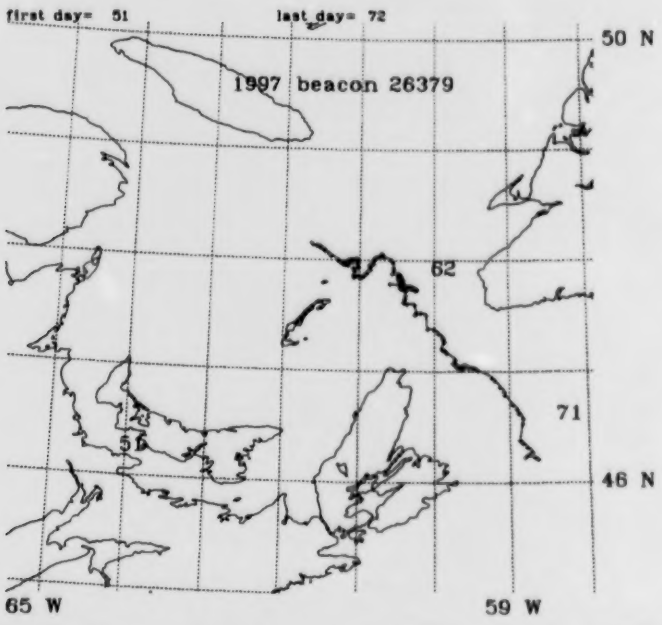

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 46.938°N | 64.229°W | day: 57.273 |
| last reported ARGOS position: | 47.164°N | 64.047°W | day: 64.7693 |

**Figure 9.1.14 1997 beacon 26375 trajectory**



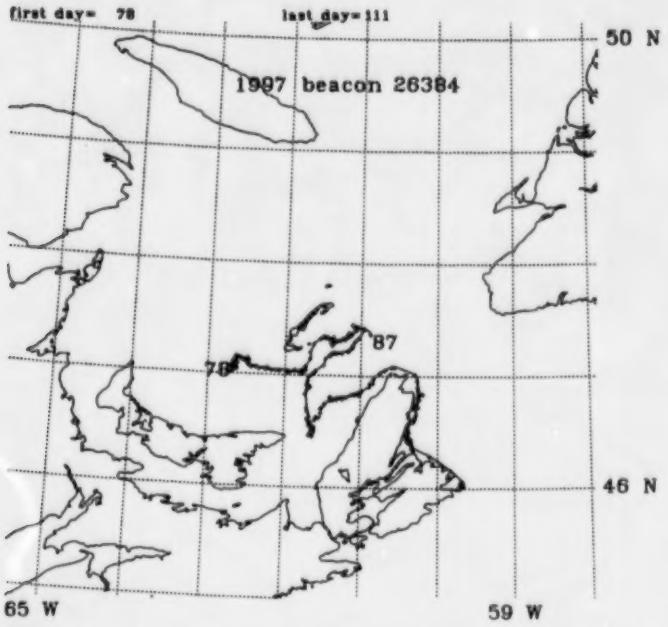

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 46.525°N | 64.387°W | day: 49.9375 |
| last reported ARGOS position: | 45.943°N | 62.445°W | day: 114.808 |

**Figure 9.1.15 1997 beacon 26376 trajectory**



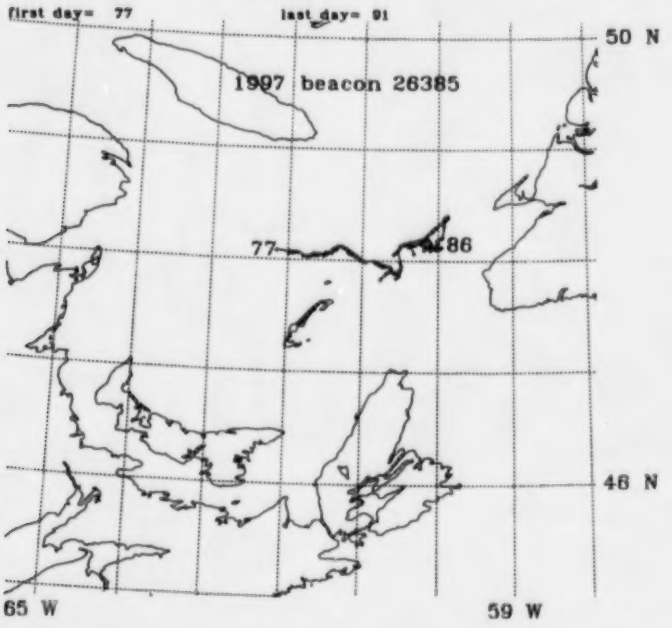

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 46.283°N | 63.740°W | day: 51.979 |
| last reported ARGOS position: | 46.227°N | 58.652°W | day: 72.8647 |

**Figure 9.1.16 1997 beacon 26379 trajectory**



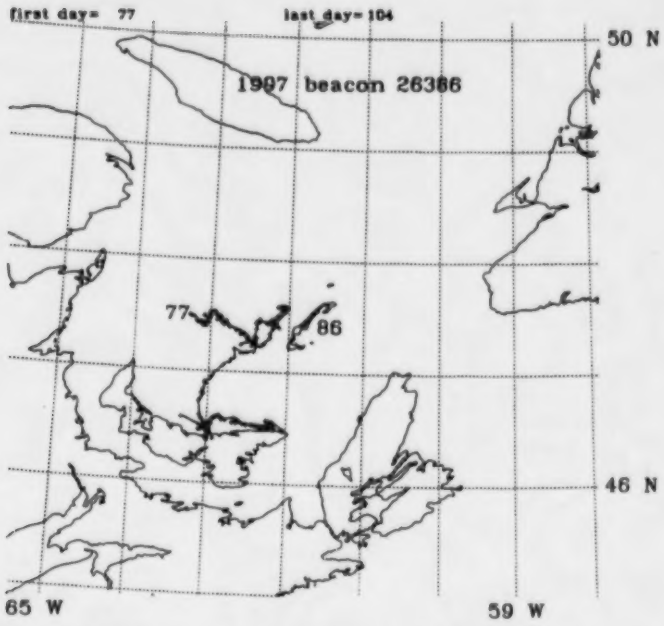

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 47.026°N | 62.706°W | day: 78.8035 |
| last reported ARGOS position: | 46.031°N | 59.693°W | day: 111.491 |

**Figure 9.1.17 1997 beacon 26384 trajectory**




| | | | |
|---|---|---|---|
| first reported ARGOS position: | 48.089°N | 62.145°W | day: 77.9297 |
| last reported ARGOS position: | 48.064°N | 60.572°W | day: 91.8557 |

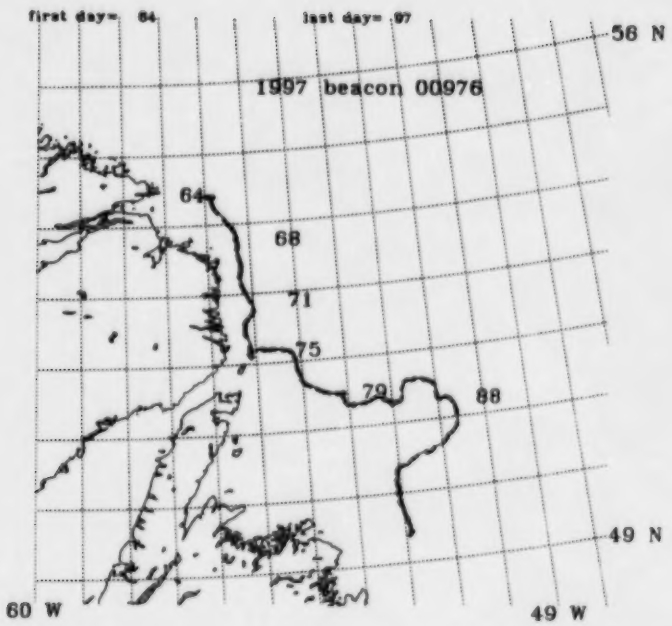
**Figure 9.1.18 1997 beacon 26385 trajectory**




| | | | |
|---|---|---|---|
| first reported ARGOS position: | 47.509°N | 63.261°W | day: 77.741 |
| last reported ARGOS position: | 46.484°N | 62.038°W | day: 104.935 |

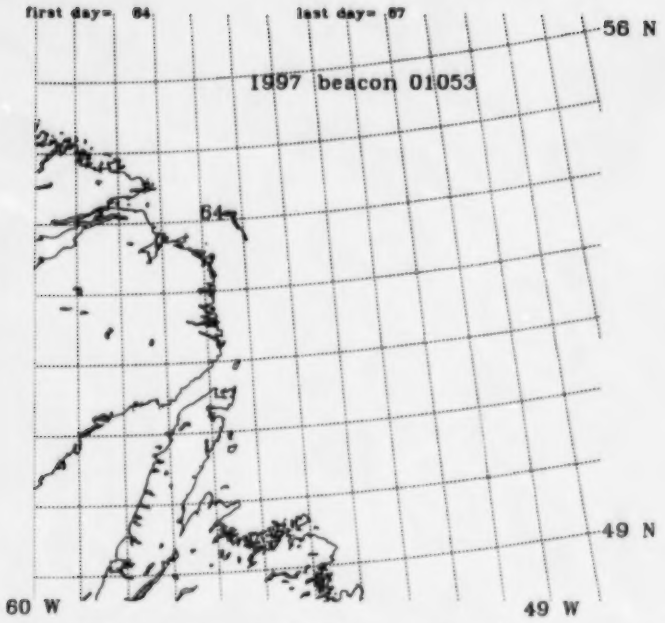
**Figure 9.1.19 1997 beacon 26386 trajectory**

## 9.2 Labrador



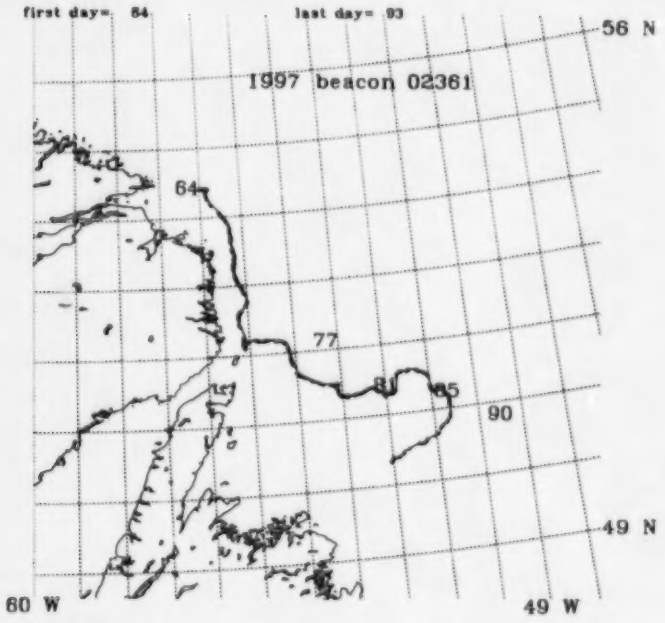

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 54.425°N | 55.978°W | day: 64.771 |
| last reported ARGOS position: | 49.450°N | 51.831°W | day: 97.9736 |

**Figure 9.2.1 1997 beacon 976 trajectory**



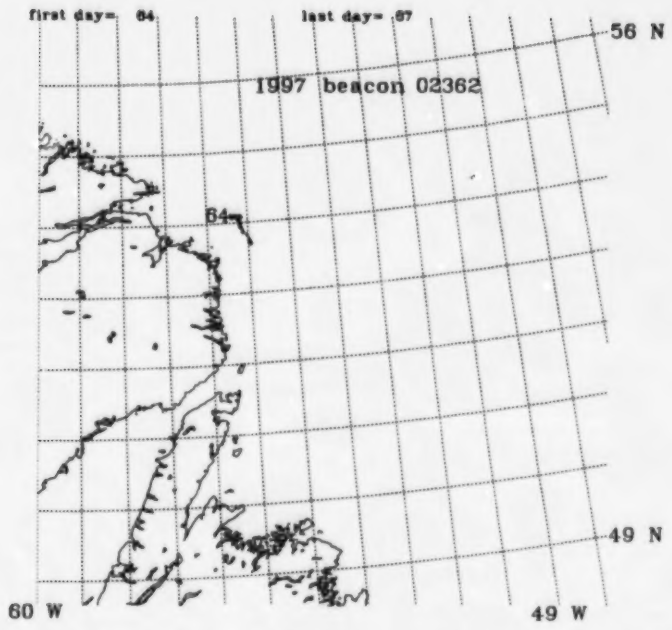

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 54.100°N | 55.399°W | day: 64.5796 |
| last reported ARGOS position: | 53.711°N | 54.926°W | day: 67.3355 |

**Figure 9.2.2 1997 beacon 1053 trajectory**



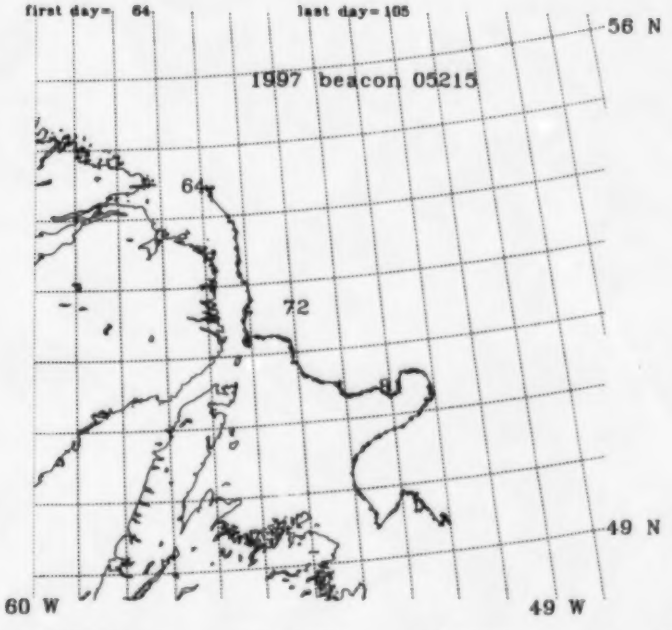

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 54.425°N | 55.982°W | day: 64.771 |
| last reported ARGOS position: | 50.330°N | 52.019°W | day: 93.7588 |

**Figure 9.2.3 1997 beacon 2361 trajectory**



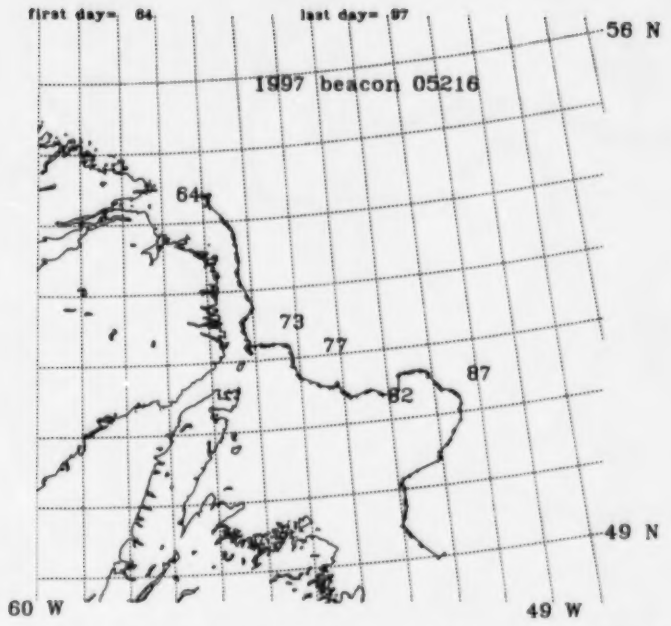

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 54.109°N | 55.399°W | day: 64.5791 |
| last reported ARGOS position: | 53.707°N | 54.921°W | day: 67.3355 |

**Figure 9.2.4 1997 beacon 2362 trajectory**



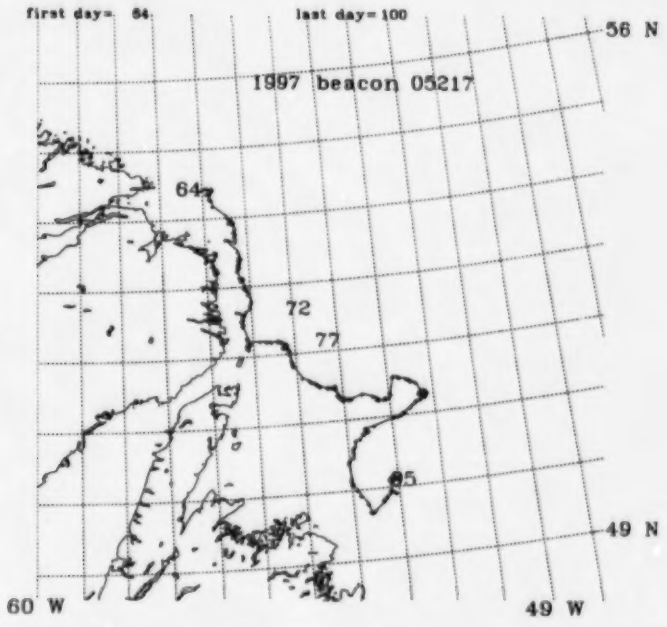

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 54.439°N | 55.862°W | day: 64.9895 |
| last reported ARGOS position: | 49.397°N | 51.001°W | day: 105.919 |

**Figure 9.2.5 1997 beacon 5215 trajectory**



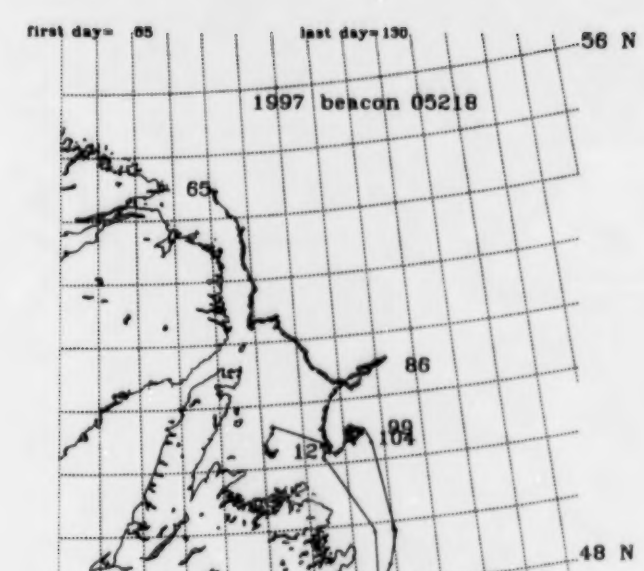

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 54.395°N | 56.006°W | day: 64.9202 |
| last reported ARGOS position: | 49.033°N | 51.197°W | day: 97.6572 |

**Figure 9.2.6 1997 beacon 5216 trajectory**



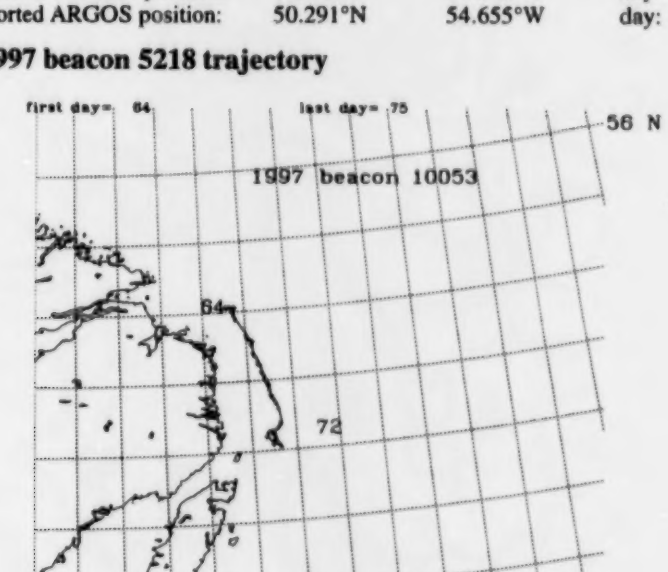

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 54.424°N | 55.980°W | day: 64.99 |
| last reported ARGOS position: | 50.118°N | 52.026°W | day: 100.296 |

**Figure 9.2.7 1997 beacon 5217 trajectory**



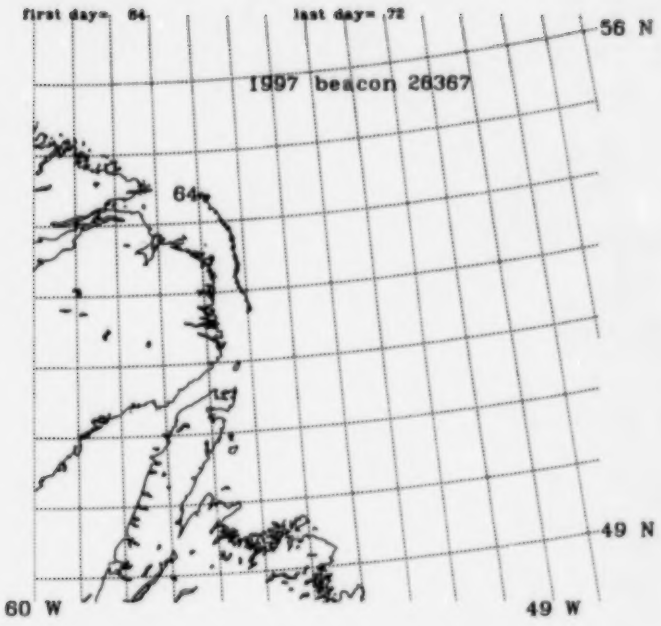

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 54.468°N | 55.940°W | day: 65.3511 |
| last reported ARGOS position: | 50.291°N | 54.655°W | day: 130.887 |

**Figure 9.2.8 1997 beacon 5218 trajectory**



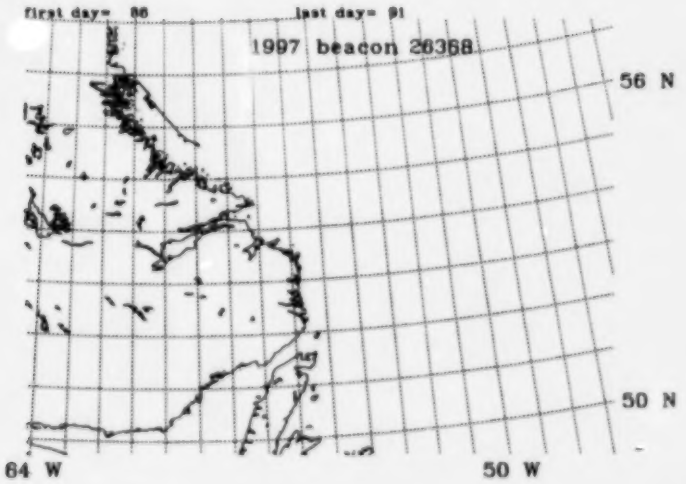

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 54.077°N | 55.407°W | day: 64.8486 |
| last reported ARGOS position: | 52.288°N | 54.541°W | day: 75.8911 |

**Figure 9.2.9 1997 beacon 10053 trajectory**



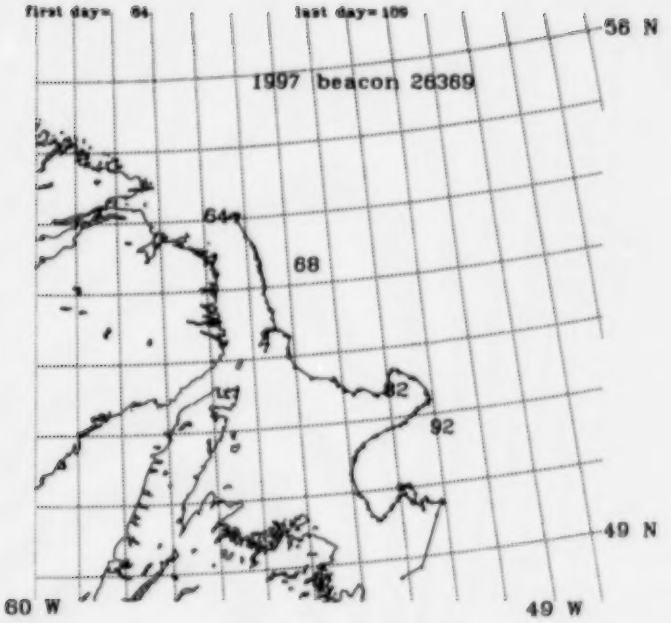

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 54.403°N | 55.971°W | day: 64.7717 |
| last reported ARGOS position: | 52.710°N | 54.986°W | day: 72.5278 |

**Figure 9.2.10 1997 beacon 26367 trajectory**



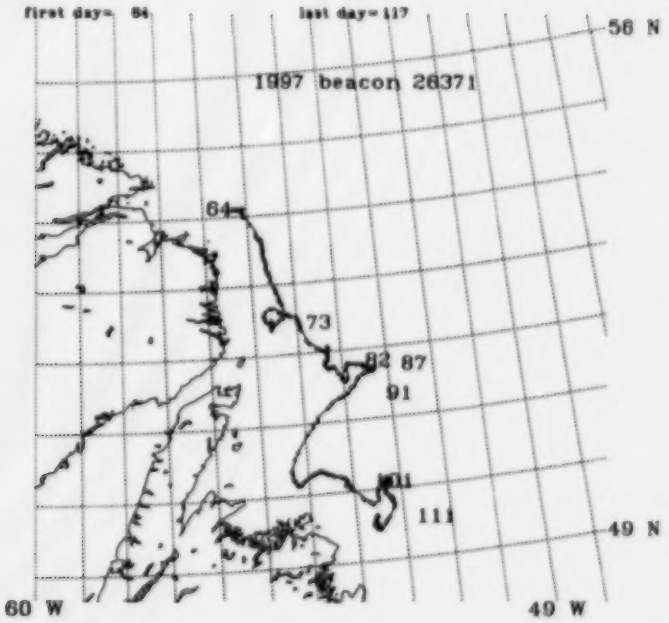

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 56.872°N | 60.902°W | day: 86.813 |
| last reported ARGOS position: | 55.665°N | 58.882°W | day: 91.7761 |

**Figure 9.2.11 1997 beacon 26368 trajectory**



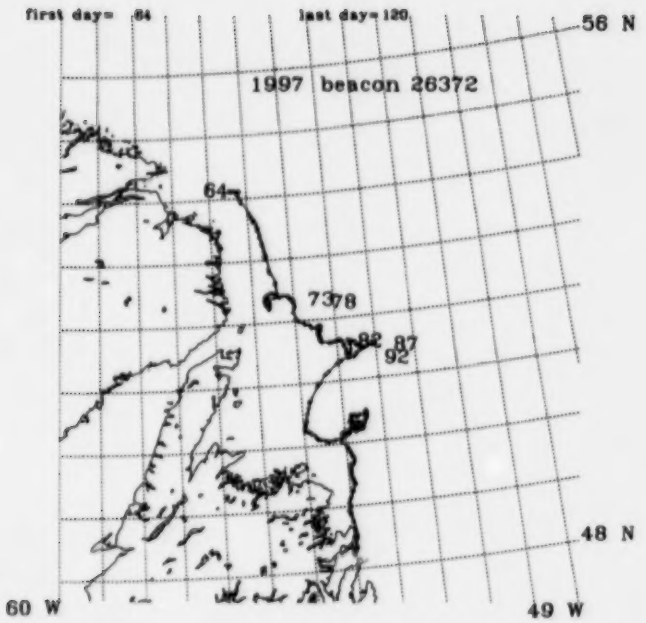

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 54.042°N | 55.358°W | day: 64.771 |
| last reported ARGOS position: | 48.730°N | 52.138°W | day: 109.779 |

**Figure 9.2.12 1997 beacon 26369 trajectory**



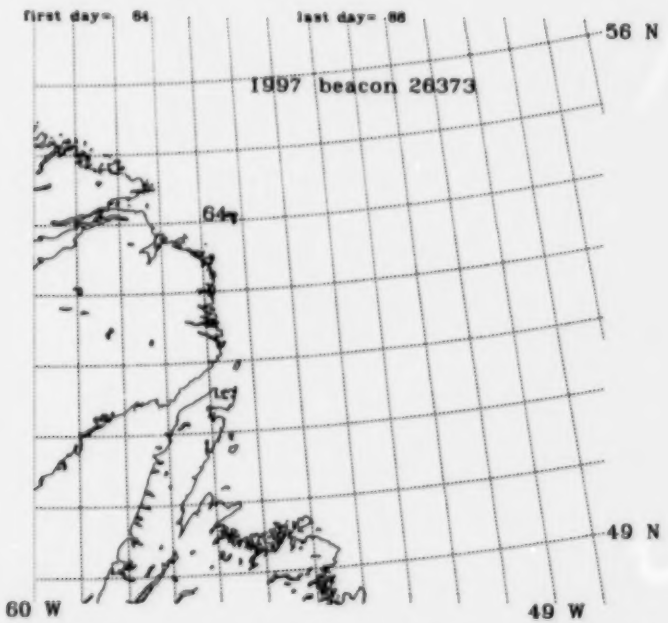

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 54.117°N | 55.292°W | day: 64.7009 |
| last reported ARGOS position: | 49.440°N | 52.492°W | day: 117.238 |

**Figure 9.2.13 1997 beacon 26371 trajectory**



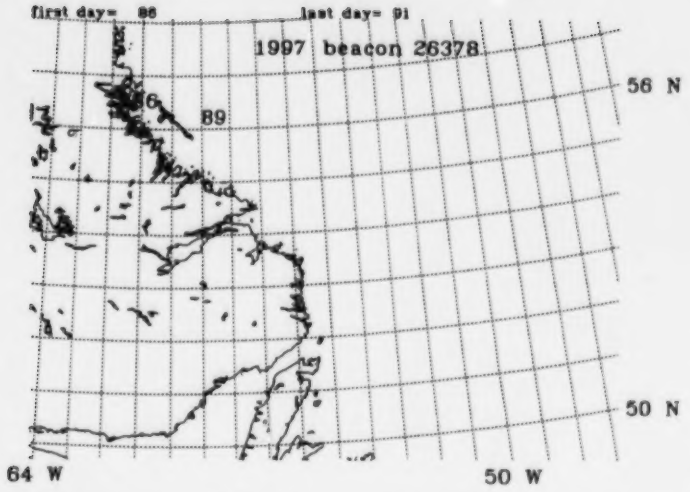

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 54.139°N | 55.432°W | day: 64.6299 |
| last reported ARGOS position: | 48.261°N | 53.331°W | day: 120.693 |

**Figure 9.2.14 1997 beacon 26372 trajectory**



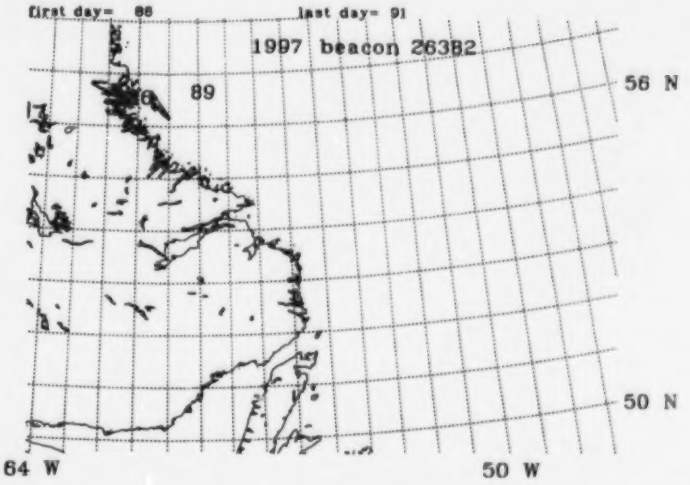

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 54.091°N | 55.313°W | day: 64.9907 |
| last reported ARGOS position: | 53.972°N | 55.180°W | day: 66.7559 |

**Figure 9.2.15 1997 beacon 26373 trajectory**



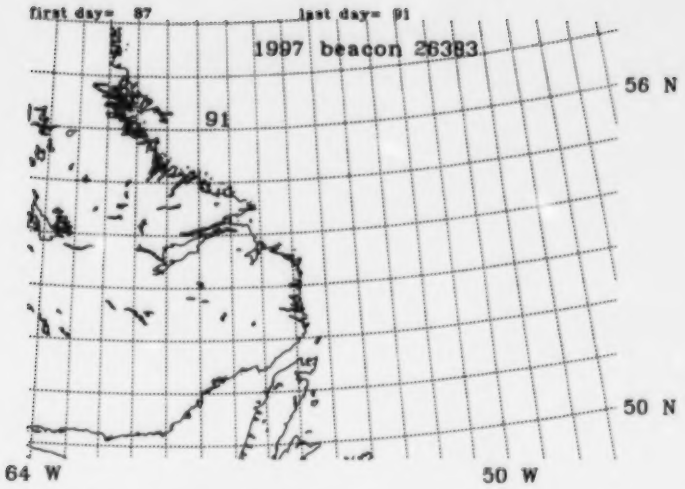

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 56.527°N | 60.447°W | day: 86.8145 |
| last reported ARGOS position: | 56.188°N | 60.379°W | day: 91.5867 |

**Figure 9.2.16 1997 beacon 26378 trajectory**



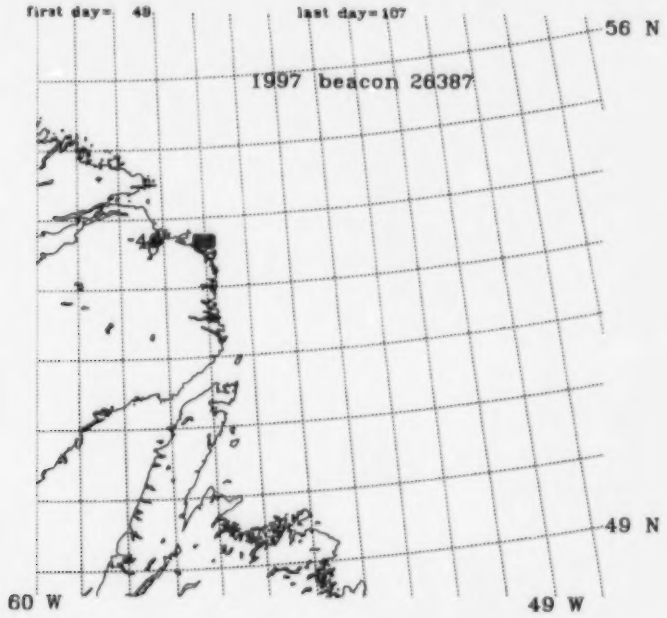

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 56.546°N | 60.509°W | day: 86.7961 |
| last reported ARGOS position: | 56.568°N | 60.452°W | day: 91.5168 |

**Figure 9.2.17 1997 beacon 26382 trajectory**



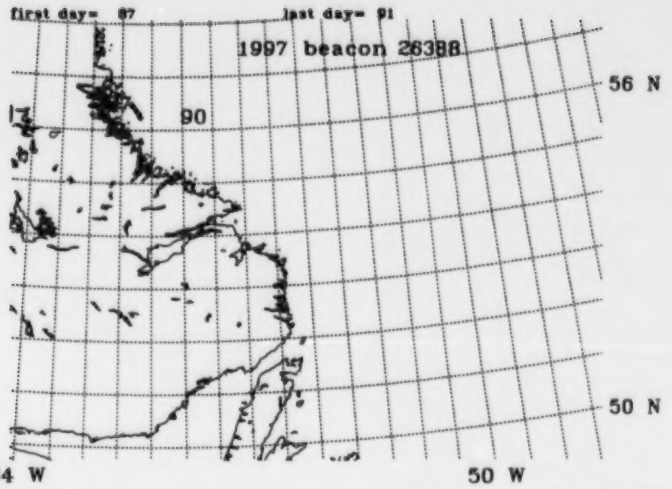

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 56.520°N | 60.616°W | day: 87.988 |
| last reported ARGOS position: | 56.194°N | 60.173°W | day: 91.5862 |

**Figure 9.2.18 1997 beacon 26383 trajectory**




| | | | |
|---|---|---|---|
| first reported ARGOS position: | 53.684°N | 57.205°W | day: 50.5979 |
| last reported ARGOS position: | 53.689°N | 57.190°W | day: 107.721 |

**Figure 9.2.19 1997 beacon 26387 trajectory**

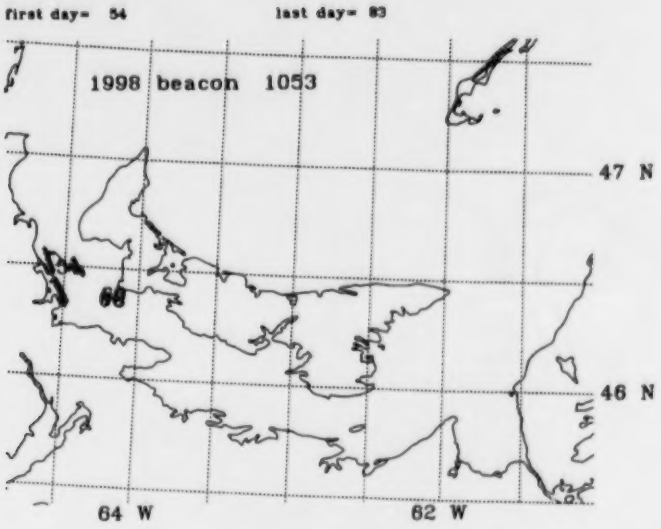



| | | | |
|---|---|---|---|
| first reported ARGOS position: | 56.503°N | 60.640°W | day: 87.8494 |
| last reported ARGOS position: | 56.255°N | 60.360°W | day: 91.5867 |

**Figure 9.2.20 1997 beacon 26388 trajectory**

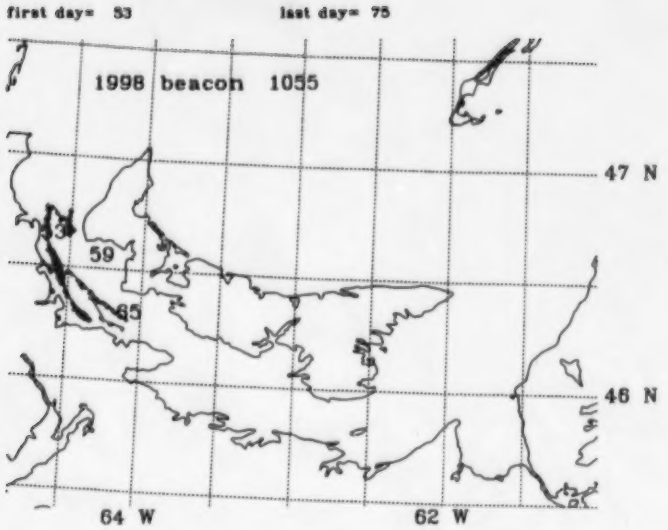
# 10 APPENDIX C: 1998 ARGOS BEACON TRACKS

## 10.1 Gulf of St. Lawrence



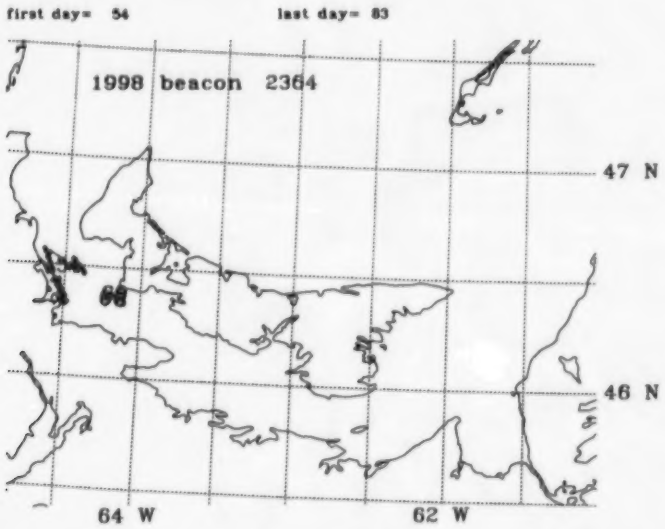

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 46.498°N | 64.387°W | day: 54.7173 |
| last reported ARGOS position: | 46.338°N | 64.488°W | day: 83.5662 |

**Figure 10.1.1 1998 beacon 1053 trajectory**



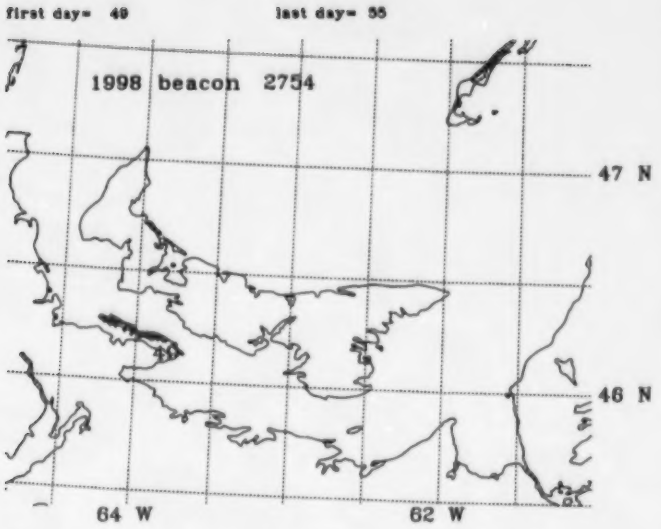

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 46.654°N | 64.527°W | day: 53.7961 |
| last reported ARGOS position: | 46.236°N | 64.109°W | day: 75.9524 |

**Figure 10.1.2 1998 beacon 1055 trajectory**



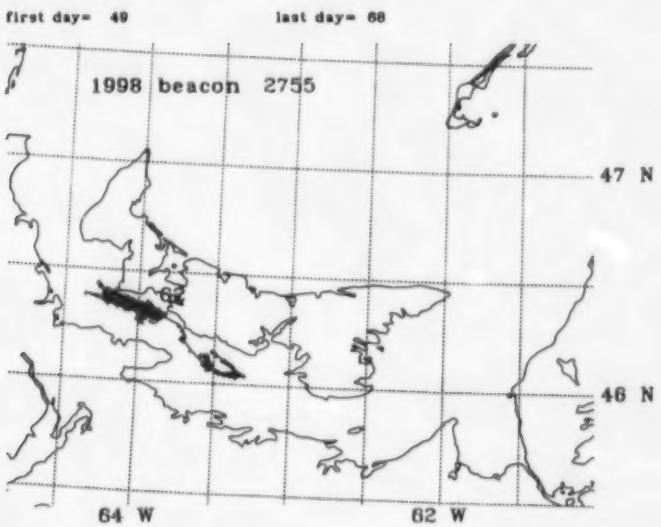

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 46.501°N | 64.391°W | day: 54.6753 |
| last reported ARGOS position: | 46.339°N | 64.493°W | day: 85.5667 |

**Figure 10.1.3 1998 beacon 2364 trajectory**



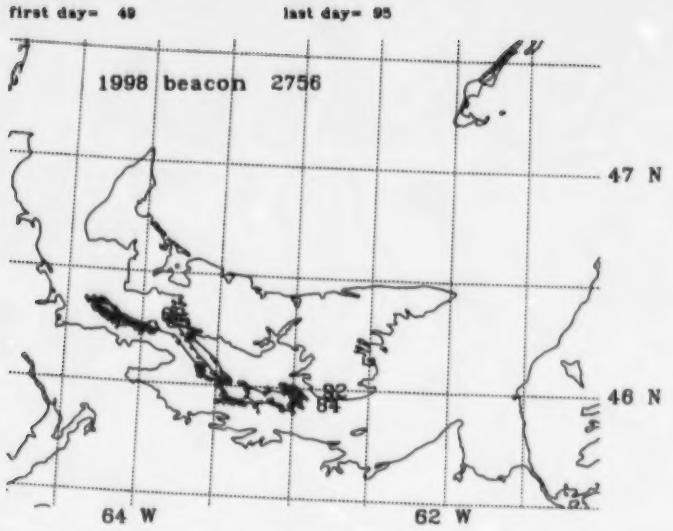

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 46.131°N | 63.717°W | day: 49.8267 |
| last reported ARGOS position: | 46.201°N | 63.975°W | day: 55.7805 |

**Figure 10.1.4 1998 beacon 2754 trajectory**



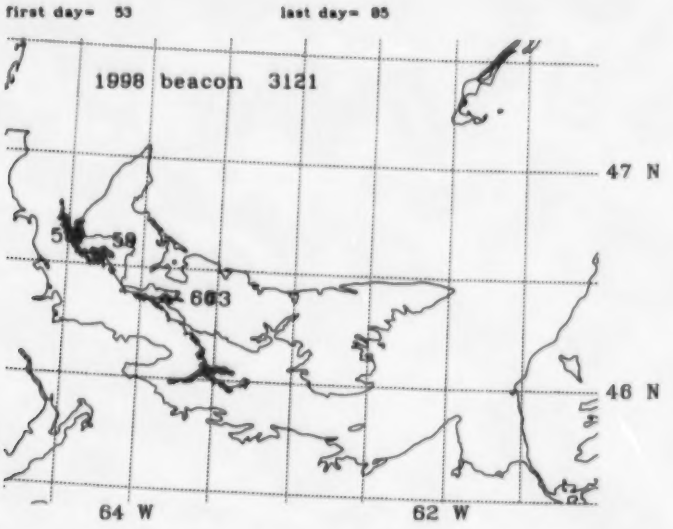

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 46.292°N | 63.855°W | day: 49.8272 |
| last reported ARGOS position: | 46.150°N | 63.511°W | day: 68.8523 |

**Figure 10.1.5 1998 beacon 2755 trajectory**



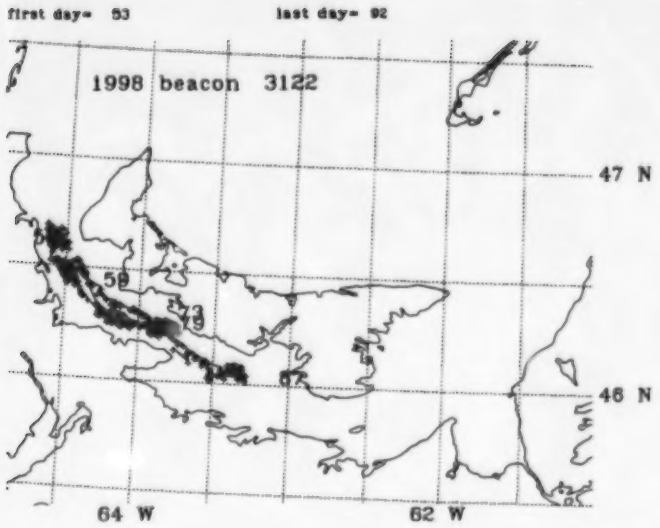

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 46.245°N | 63.886°W | day: 49.8267 |
| last reported ARGOS position: | 45.890°N | 63.219°W | day: 95.0186 |

**Figure 10.1.6 1998 beacon 2756 trajectory**



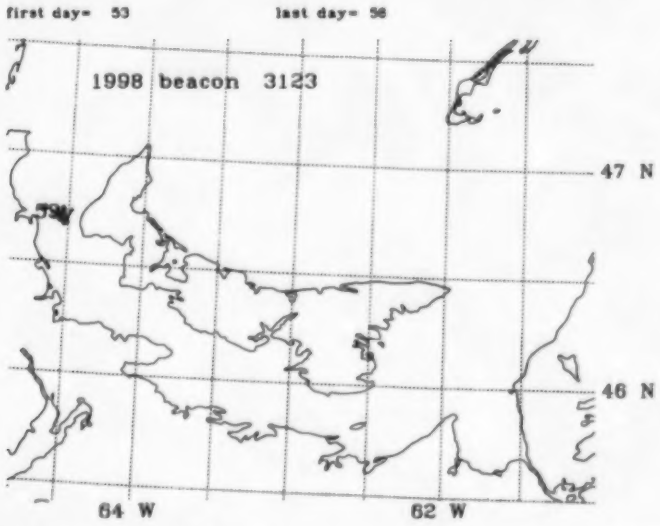

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 46.622°N | 64.445°W | day: 53.8733 |
| last reported ARGOS position: | 46.015°N | 63.298°W | day: 85.6191 |

**Figure 10.1.7 1998 beacon 3121 trajectory**



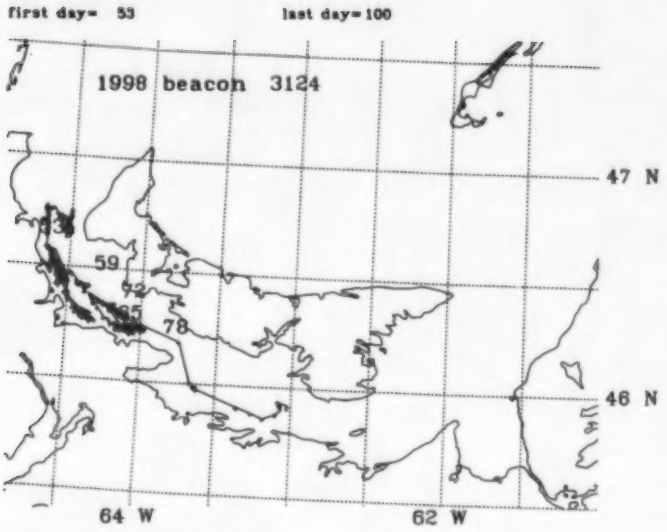

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 46.625°N | 64.567°W | day: 53.7969 |
| last reported ARGOS position: | 46.153°N | 63.768°W | day: 92.9714 |

**Figure 10.1.8 1998 beacon 3122 trajectory**



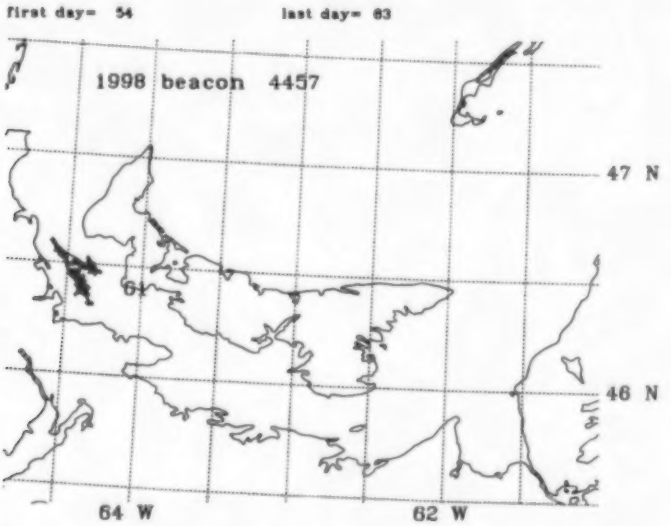

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 46.728°N | 64.560°W | day: 53.7263 |
| last reported ARGOS position: | 46.740°N | 64.680°W | day: 56.9663 |

**Figure 10.1.9 1998 beacon 3123 trajectory**



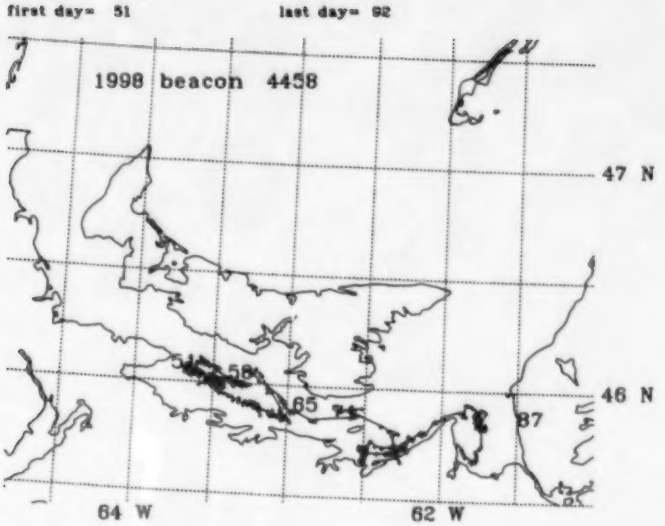

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 46.675°N | 64.539°W | day: 53.6577 |
| last reported ARGOS position: | 45.909°N | 63.023°W | day: 100.557 |

**Figure 10.1.10 1998 beacon 3124 trajectory**



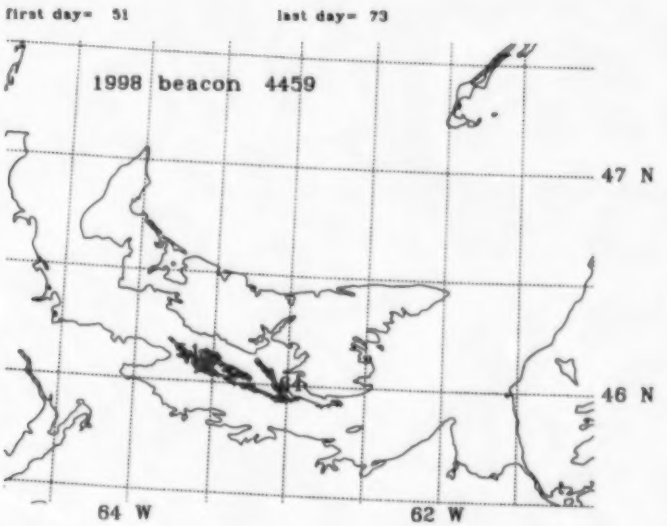

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 46.488°N | 64.312°W | day: 54.7173 |
| last reported ARGOS position: | 46.323°N | 64.340°W | day: 63.4541 |

**Figure 10.1.11 1998 beacon 4457 trajectory**



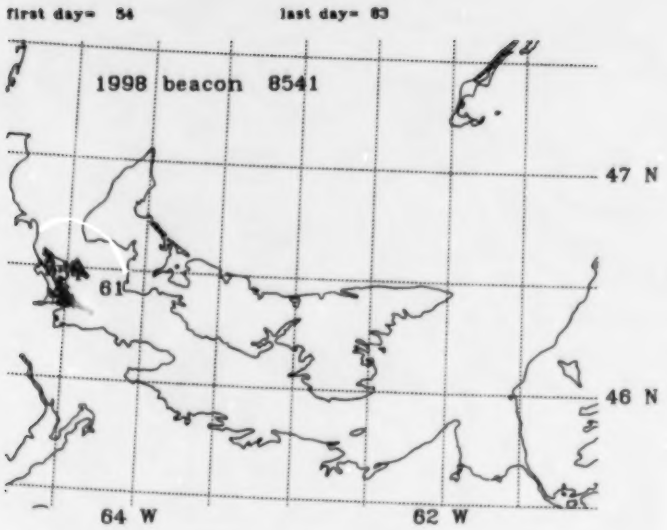

first reported ARGOS position: 46.089°N 63.602°W day: 51.9036
last reported ARGOS position: 45.765°N 61.886°W day: 92.5576

**Figure 10.1.12 1998 beacon 4458 trajectory**



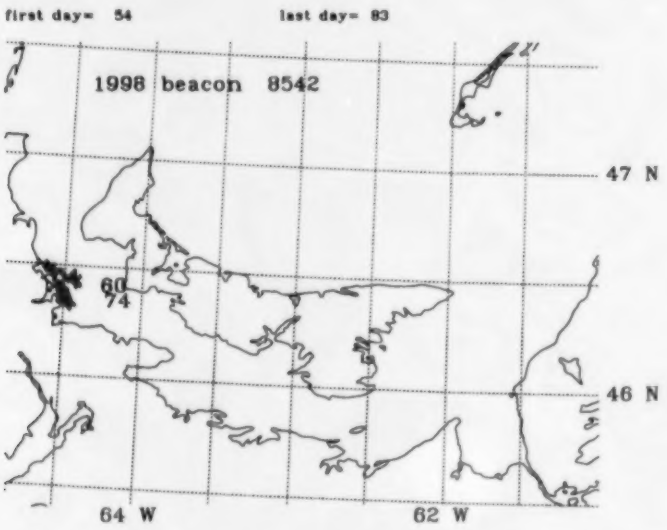

first reported ARGOS position: 46.137°N 63.575°W day: 51.9031
last reported ARGOS position: 45.943°N 62.664°W day: 73.783

**Figure 10.1.13 1998 beacon 4459 trajectory**



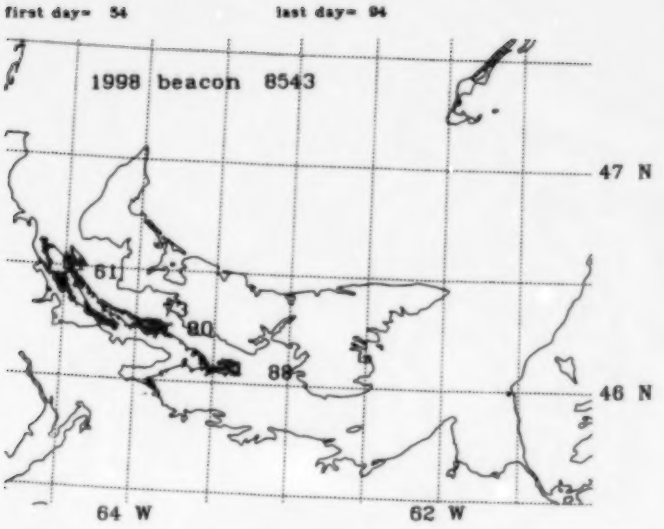

first reported ARGOS position: 46.475°N 64.389°W day: 54.8574
last reported ARGOS position: 46.340°N 64.496°W day: 83.5669

**Figure 10.1.14 1998 beacon 8541 trajectory**



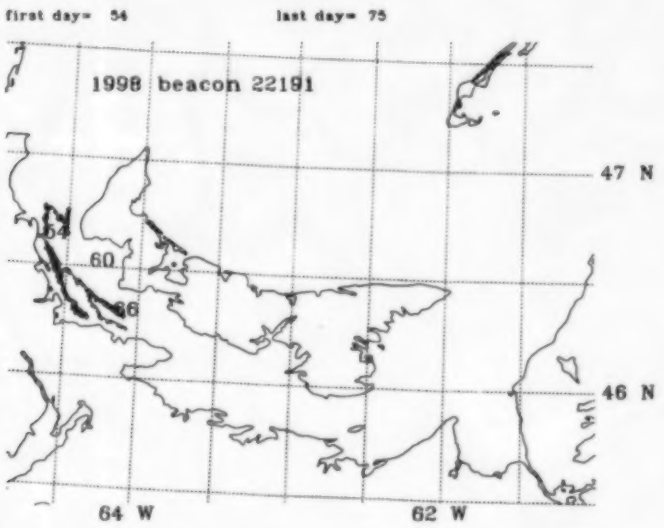

first reported ARGOS position: 46.454°N 64.399°W day: 54.7192
last reported ARGOS position: 46.334°N 64.481°W day: 83.4946

**Figure 10.1.15 1998 beacon 8542 trajectory**



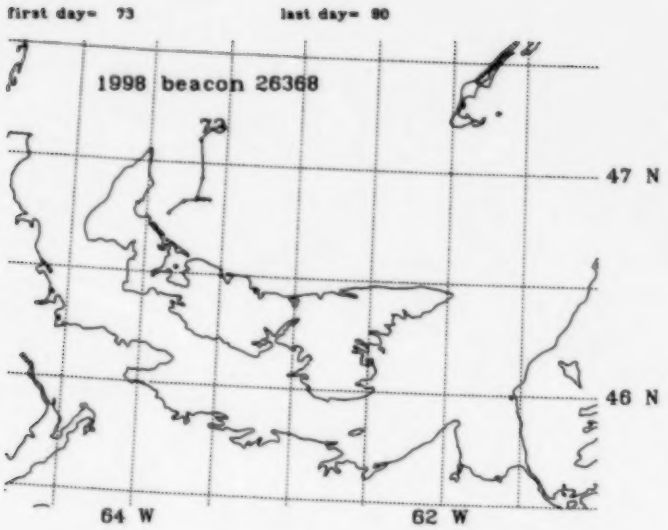

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 46.512°N | 64.355°W | day: 54.9456 |
| last reported ARGOS position: | 45.935°N | 63.831°W | day: 94.6118 |

**Figure 10.1.16 1998 beacon 8543 trajectory**



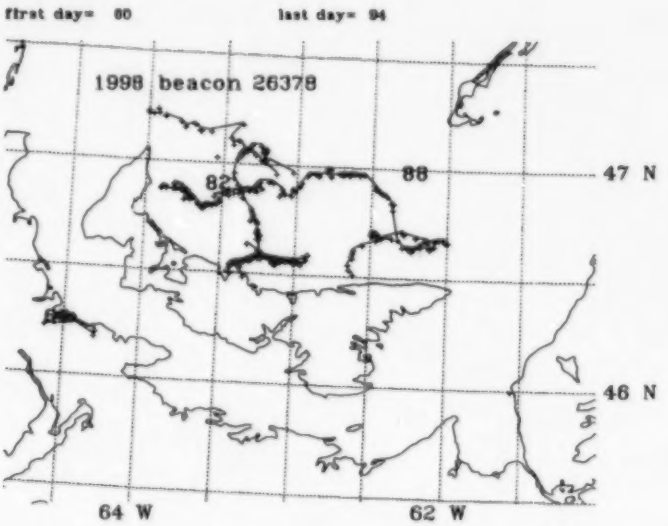

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 46.649°N | 64.494°W | day: 54.929 |
| last reported ARGOS position: | 46.226°N | 64.072°W | day: 75.7688 |

**Figure 10.1.17 1998 beacon 22191 trajectory**



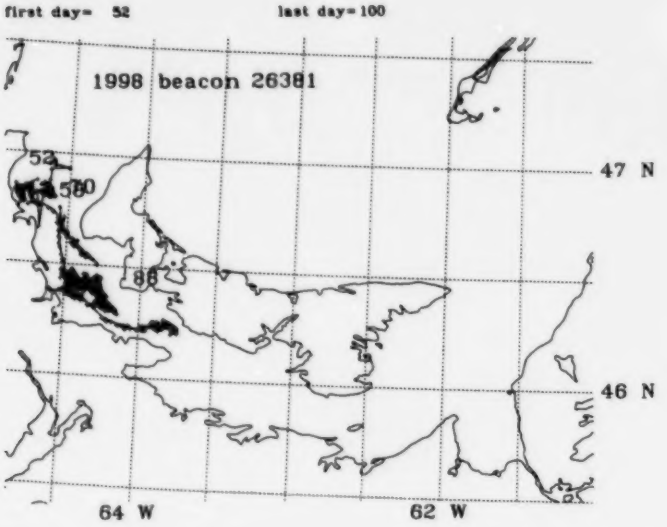

first reported ARGOS position: 47.172°N 63.517°W day: 73.3027
last reported ARGOS position: 46.773°N 63.851°W day: 80.3184

**Figure 10.1.18 1998 beacon 26368 trajectory**



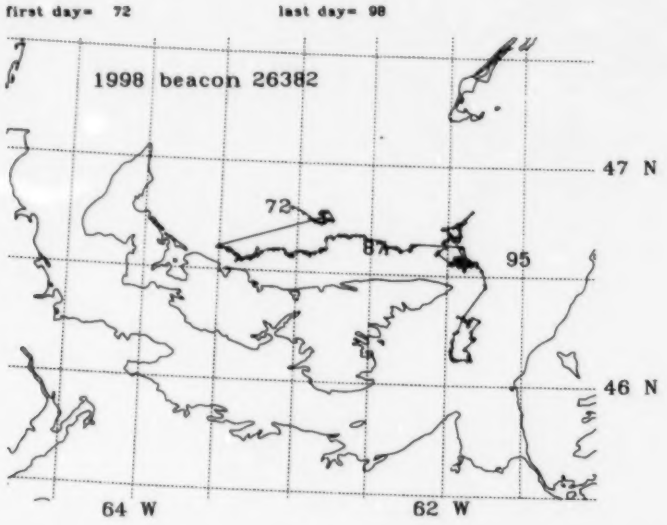

first reported ARGOS position: 46.258°N 64.454°W day: 60.2642
last reported ARGOS position: 46.521°N 62.613°W day: 94.6909

**Figure 10.1.19 1998 beacon 26378 trajectory**



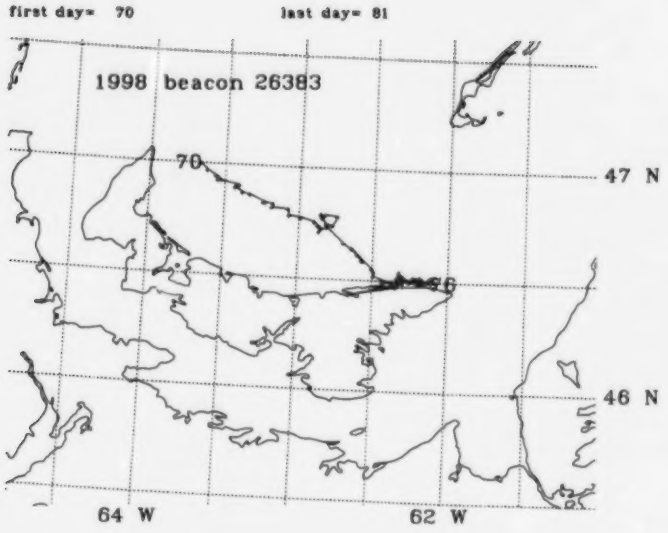

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 46.975°N | 64.610°W | day: 52.7334 |
| last reported ARGOS position: | 46.209°N | 63.780°W | day: 100.629 |

**Figure 10.1.20 1998 beacon 26381 trajectory**




| | | | |
|---|---|---|---|
| first reported ARGOS position: | 46.797°N | 63.046°W | day: 72.9299 |
| last reported ARGOS position: | 46.278°N | 61.856°W | day: 98.5772 |

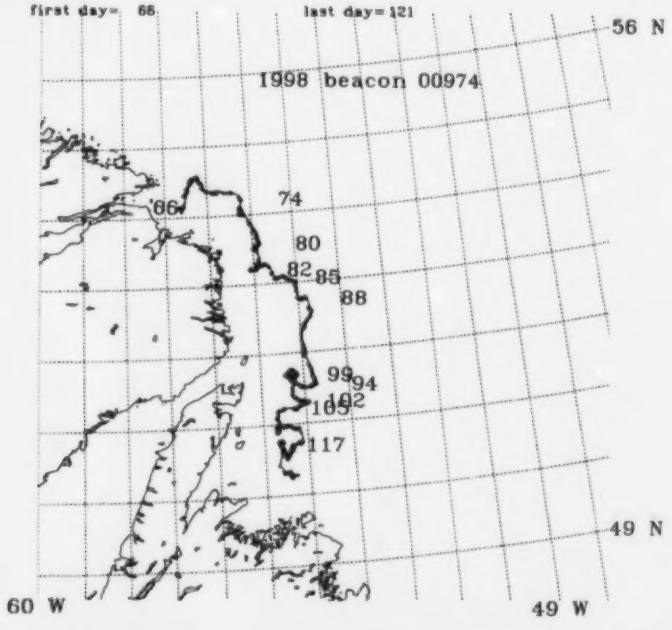
**Figure 10.1.21 1998 beacon 26382 trajectory**




| | | | |
|---|---|---|---|
| first reported ARGOS position: | 47.001°N | 296.334°W | day: 70.9478 |
| last reported ARGOS position: | 46.481°N | 297.906°W | day: 81.7913 |

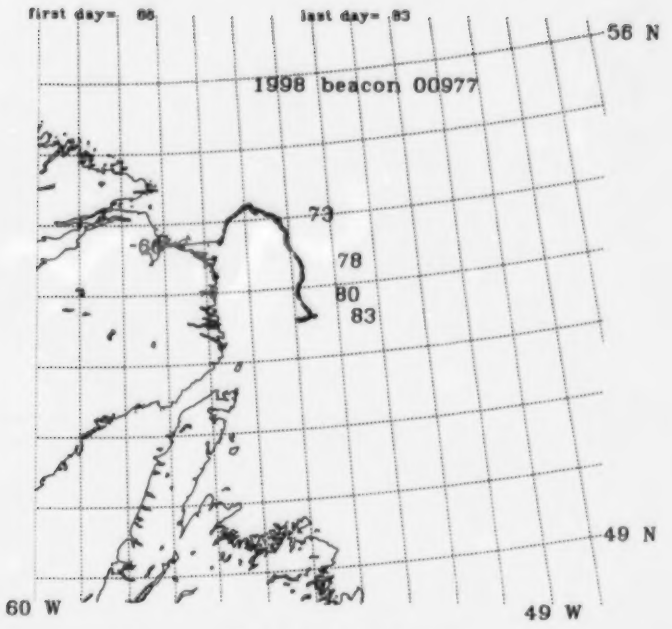
**Figure 10.1.22 1998 beacon 26383 trajectory**

## 10.2 Labrador



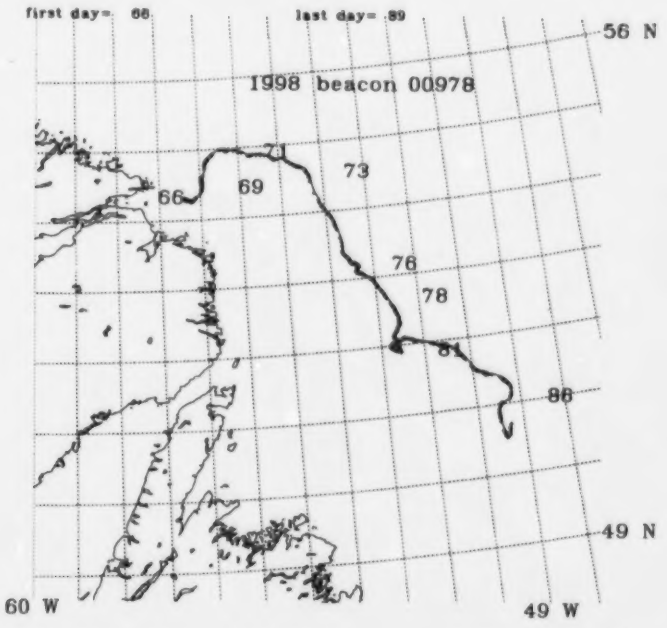

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 54.146°N | 56.655°W | day: 66.9548 |
| last reported ARGOS position: | 50.366°N | 54.271°W | day: 124.899 |

**Figure 10.2.1 1998 beacon 974 trajectory**



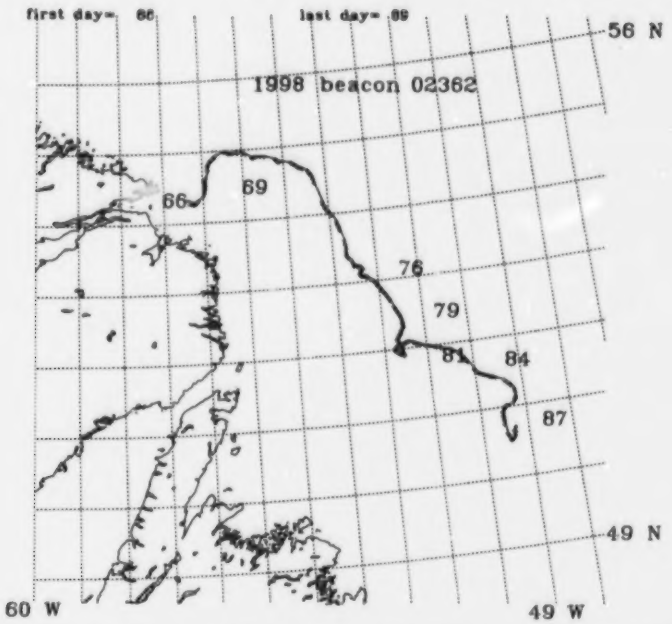

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 53.688°N | 57.019°W | day: 66.2136 |
| last reported ARGOS position: | 52.595°N | 53.504°W | day: 83.6387 |

**Figure 10.2.2 1998 beacon 977 trajectory**



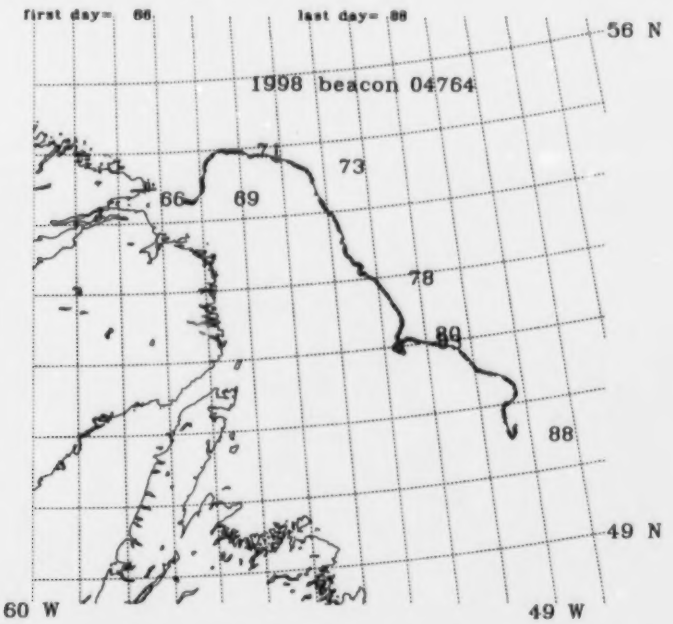

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 54.326°N | 56.398°W | day: 66.8845 |
| last reported ARGOS position: | 50.712°N | 49.274°W | day: 89.0022 |

**Figure 10.2.3 1998 beacon 978 trajectory**



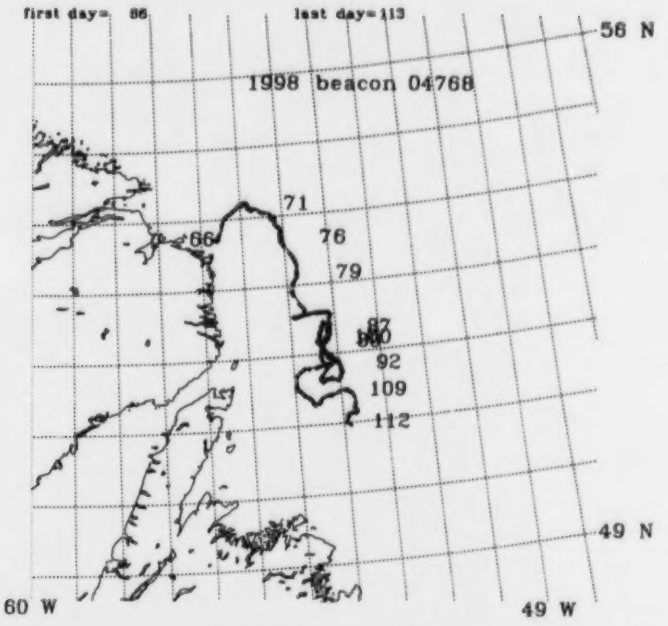

first reported ARGOS position: 54.322°N 56.403°W day: 66.9136
last reported ARGOS position: 50.714°N 49.273°W day: 89.0015

**Figure 10.2.4 1998 beacon 2362 trajectory**



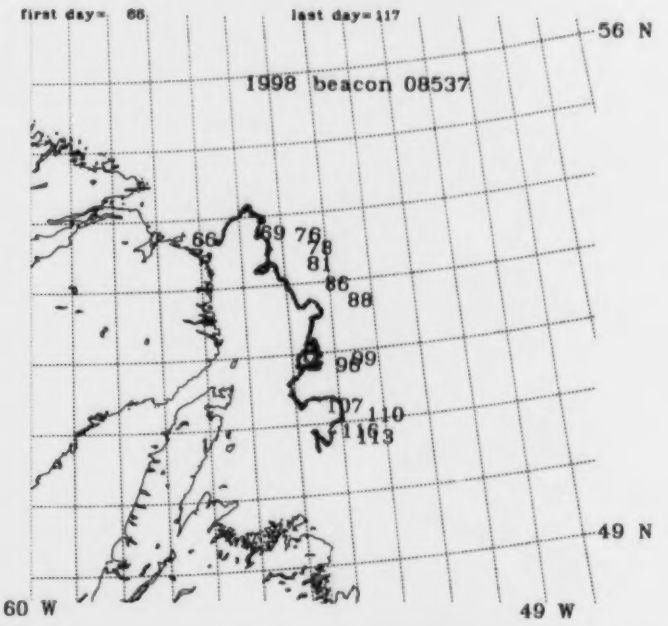

first reported ARGOS position: 54.325°N 56.397°W day: 66.8806
last reported ARGOS position: 50.695°N 49.281°W day: 88.9639

**Figure 10.2.5 1998 beacon 4764 trajectory**



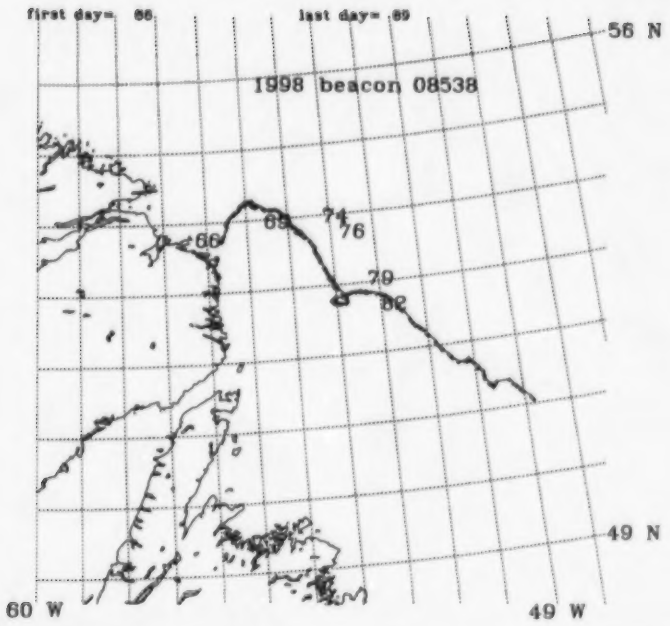

first reported ARGOS position: 53.732°N 55.665°W day: 66.7681
last reported ARGOS position: 50.972°N 52.825°W day: 113.005

**Figure 10.2.6 1998 beacon 4768 trajectory**



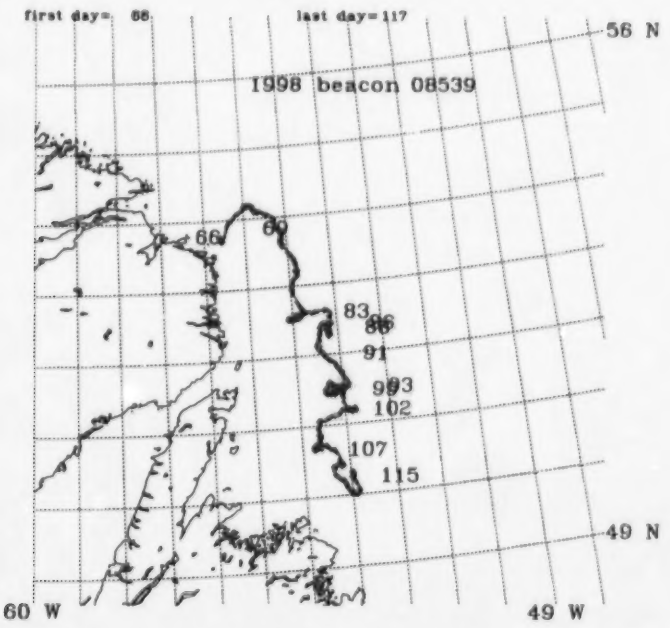

first reported ARGOS position: 53.706°N 55.570°W day: 66.8455
last reported ARGOS position: 50.631°N 53.572°W day: 117.724

**Figure 10.2.7 1998 beacon 8537 trajectory**



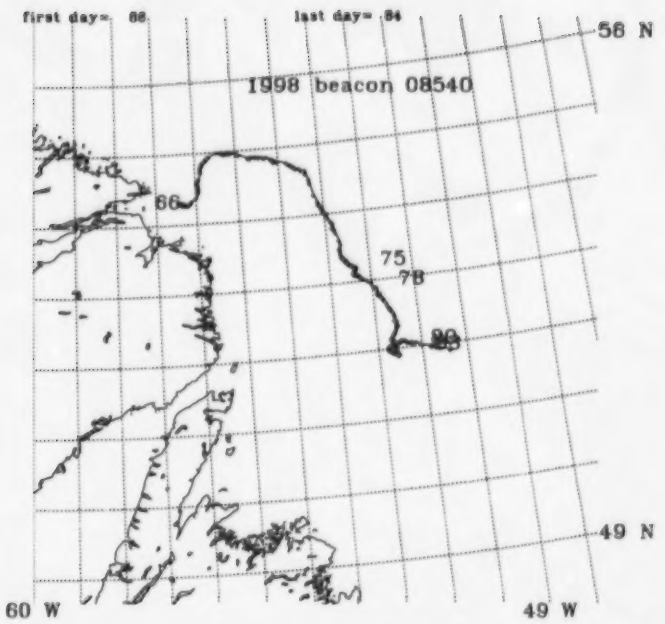

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 53.743°N | 55.658°W | day: 66.9136 |
| last reported ARGOS position: | 51.050°N | 48.786°W | day: 89.7292 |

**Figure 10.2.8 1998 beacon 8538 trajectory**



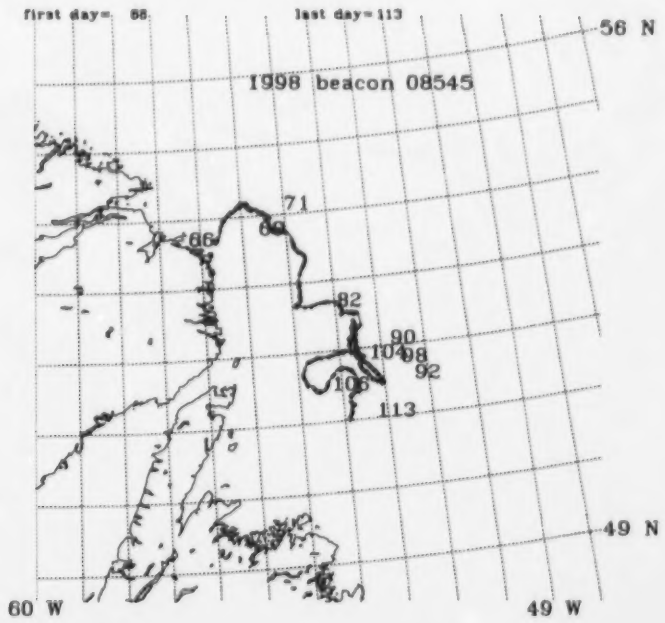

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 53.766°N | 55.585°W | day: 66.814 |
| last reported ARGOS position: | 50.331°N | 52.942°W | day: 117.038 |

**Figure 10.2.9 1998 beacon 8539 trajectory**



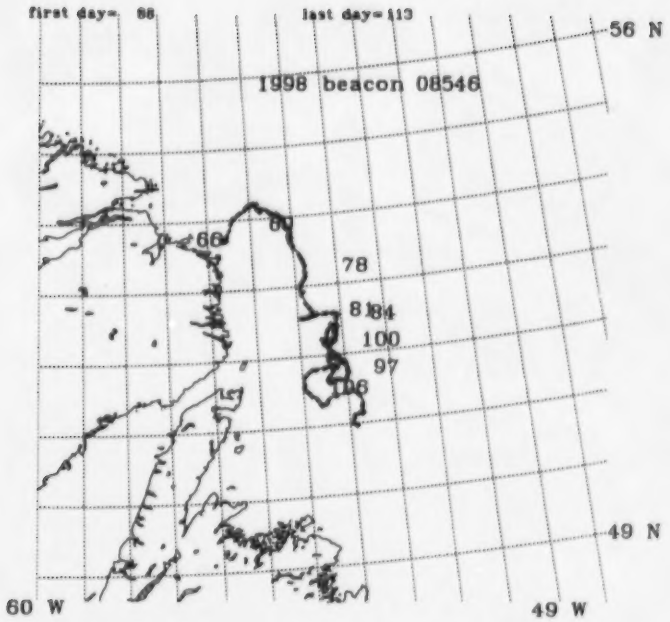

first reported ARGOS position: 54.324°N 56.383°W day: 66.9131
last reported ARGOS position: 51.891°N 50.370°W day: 84.6985

**Figure 10.2.10 1998 beacon 8540 trajectory**



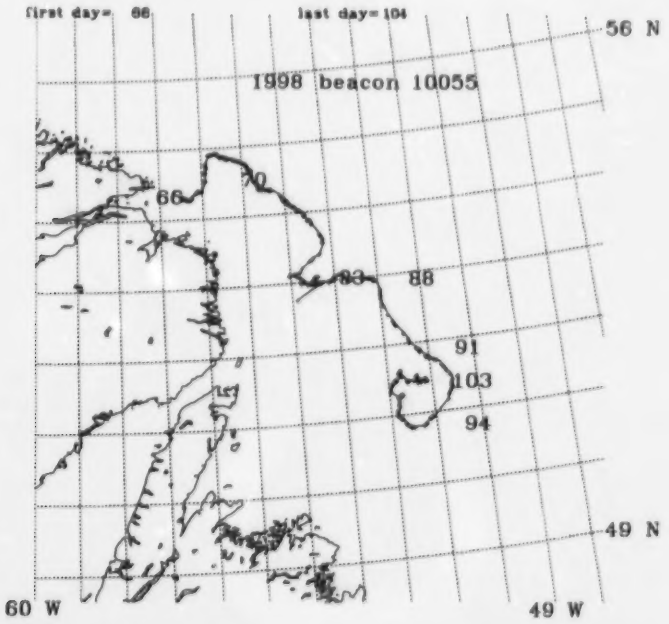

first reported ARGOS position: 53.700°N 55.659°W day: 66.8149
last reported ARGOS position: 51.016°N 52.879°W day: 113.93

**Figure 10.2.11 1998 beacon 8545 trajectory**



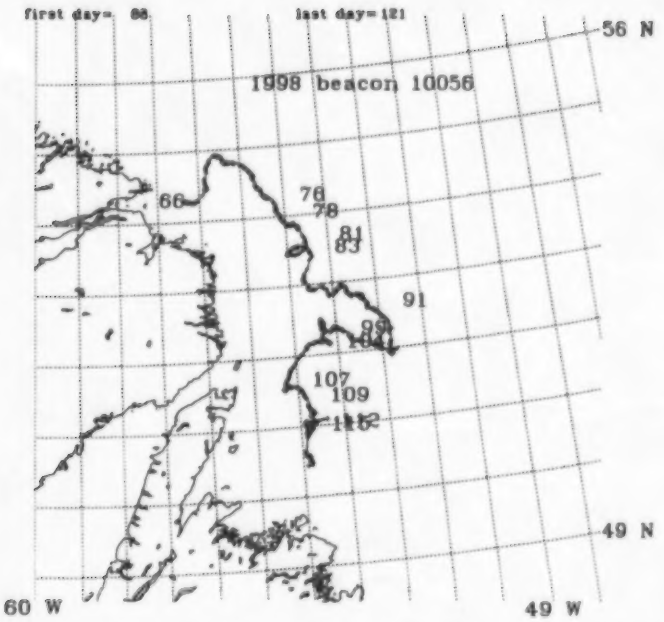

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 53.735°N | 55.639°W | day: 66.7669 |
| last reported ARGOS position: | 50.976°N | 52.822°W | day: 113.005 |

**Figure 10.2.12 1998 beacon 3546 trajectory**



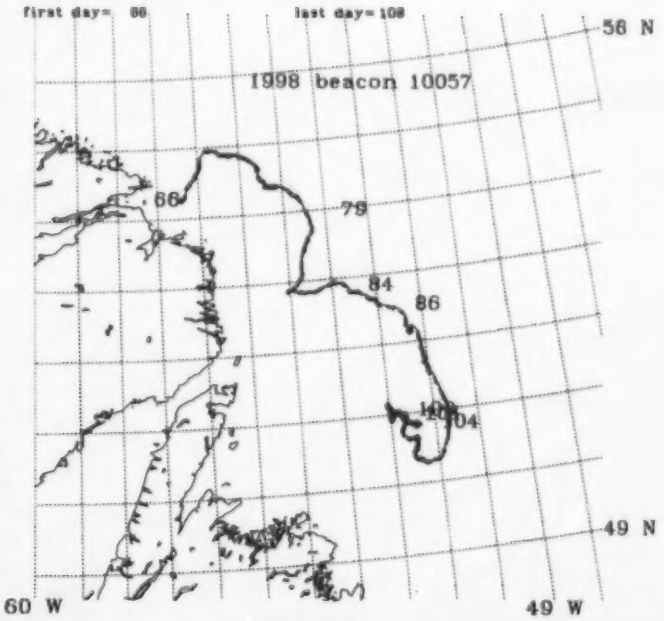

| | | | |
|---|---|---|---|
| first reported ARGOS position: | 54.318°N | 56.449°W | day: 66.9119 |
| last reported ARGOS position: | 51.518°N | 51.333°W | day: 104.858 |

**Figure 10.2.13 1998 beacon 10055 trajectory**



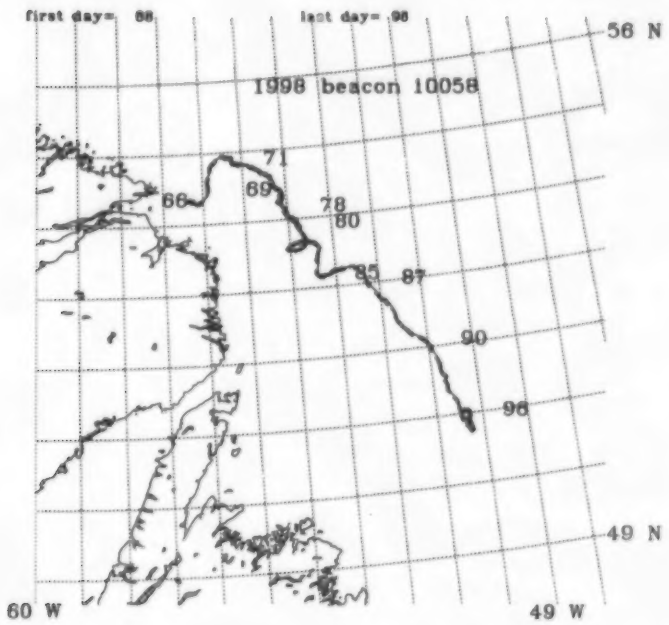

first reported ARGOS position: 54.303°N 56.327°W day: 66.9119
last reported ARGOS position: 50.245°N 53.908°W day: 122.986

**Figure 10.2.14 1998 beacon 10056 trajectory**




first reported ARGOS position: 54.277°N 56.439°W day: 66.9536
last reported ARGOS position: 51.029°N 51.972°W day: 108.489

**Figure 10.2.15 1998 beacon 10057 trajectory**




| | | | |
|---|---|---|---|
| first reported ARGOS position: | 54.352°N | 56.387°W | day: 66.9531 |
| last reported ARGOS position: | 51.045°N | 50.404°W | day: 96.3655 |

**Figure 10.2.16 1998 beacon 10058 trajectory**

# 11 APPENDIX D: 1995 DATA AND PLOTS

## 11.1 1995 Miscellaneous data

**Table 11.1.1 Labrador Shelf 29 March 1995 ice station data**

**Labrador, pack-ice site off Cape Harrison 54°51.42'N, 57°27.82'W**
**29 March 1995 (day 88) at 15:10 (GMT)**

**salinity samples on pack-ice**

| description | depth (cm) | salinity (psu) |
|---|---|---|
| ice | 5 | 8 |
| ice | 15 | 7 |
| ice | 20 | 7 |
| ice | 35 | 9 |

**ice thickness: 54 cm**
**snow thickness: 4 to 5 cm**

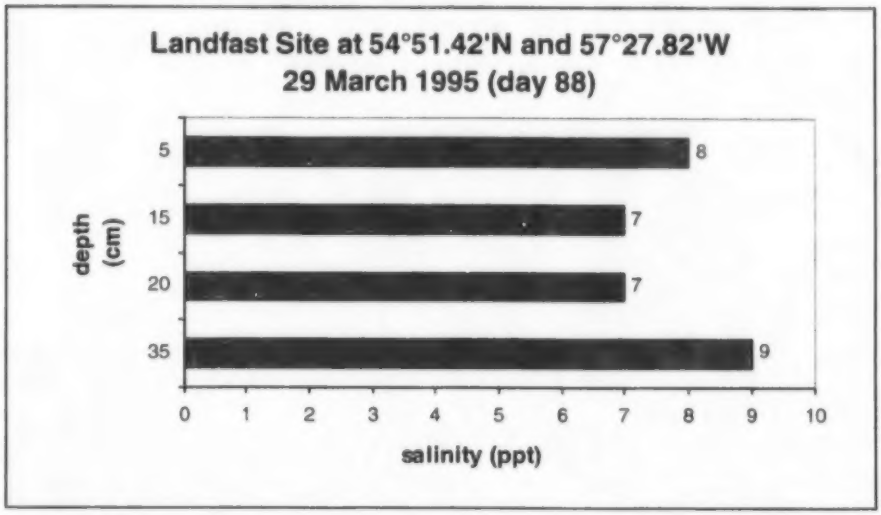



**Figure 11.1.1 Labrador Shelf 29 March 1995 ice station data**

**Table 11.1.2 Labrador Shelf 4 April 1995 ice station data**

**Labrador, pack-ice site off Cape Harrison 54°51.42'N, 57°27.82'W**
**4 April 1995 (day 94) at 15:00 (GMT)**

**salinity samples on pack-ice**

| description | depth (cm) | salinity (psu) |
|---|---|---|
| top of snow | | 0 |
| bottom of snow | | 6 |
| ice | 5 | 8 |
| ice | 10 | 8 |
| ice (wet) | 15 | 14 |
| ice (second hole) | 20 | 5 |
| ice | 30 | 8 |

**salinity samples of brine drainage water**

| description/depth (cm) | depth (cm) | salinity (psu) |
|---|---|---|
| 30-cm hole | | 58 |
| 15-cm hole | | 62 |

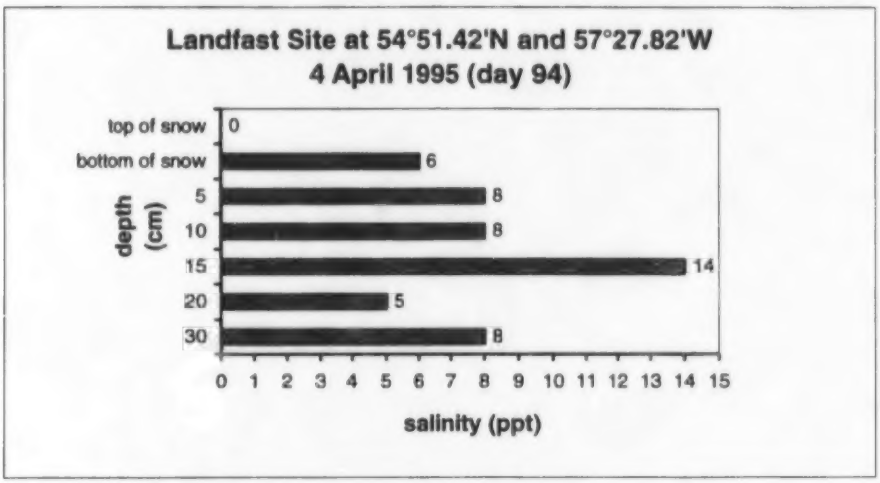



**Figure 11.1.2 Labrador Shelf 4 April 1995 ice station data**

## 11.2 1995 Pressure data

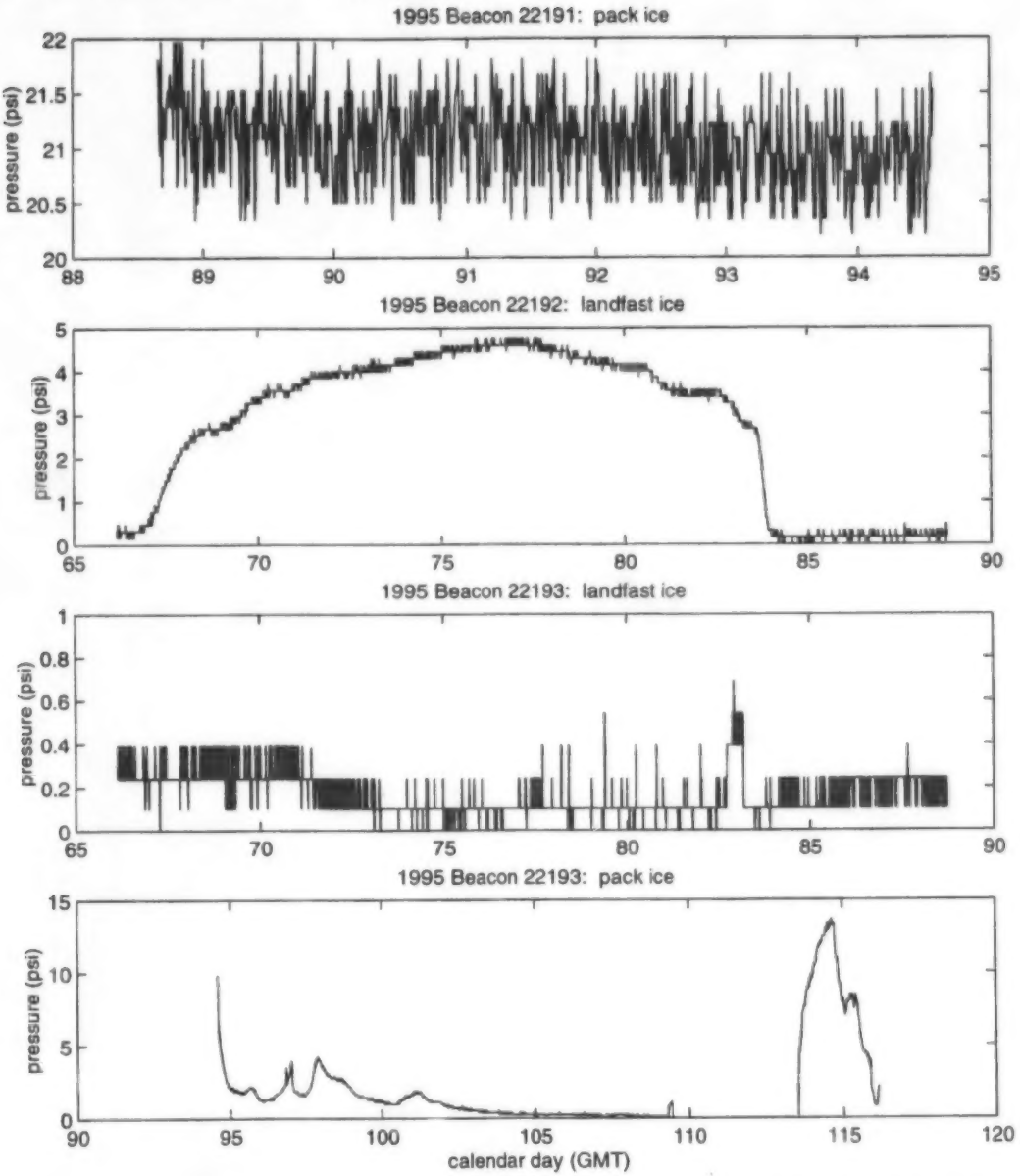



**Figure 11.2.1 1995 data from uni-axial pressure beacons 22191, 22192, and 22193**

## 11.3 1995 Temperature staff data

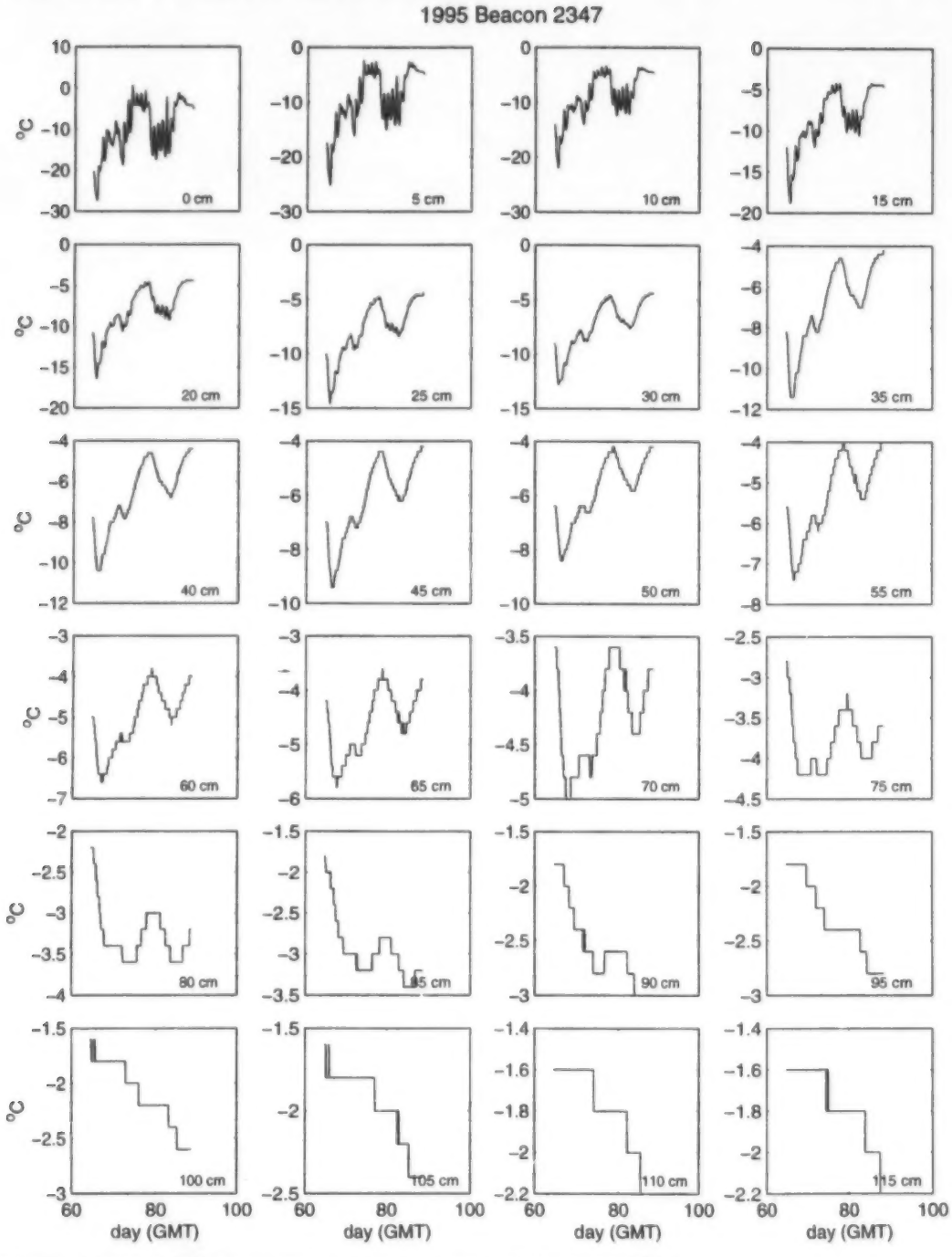



**Figure 11.3.1 1995 data from temperature staff beacon 2347**

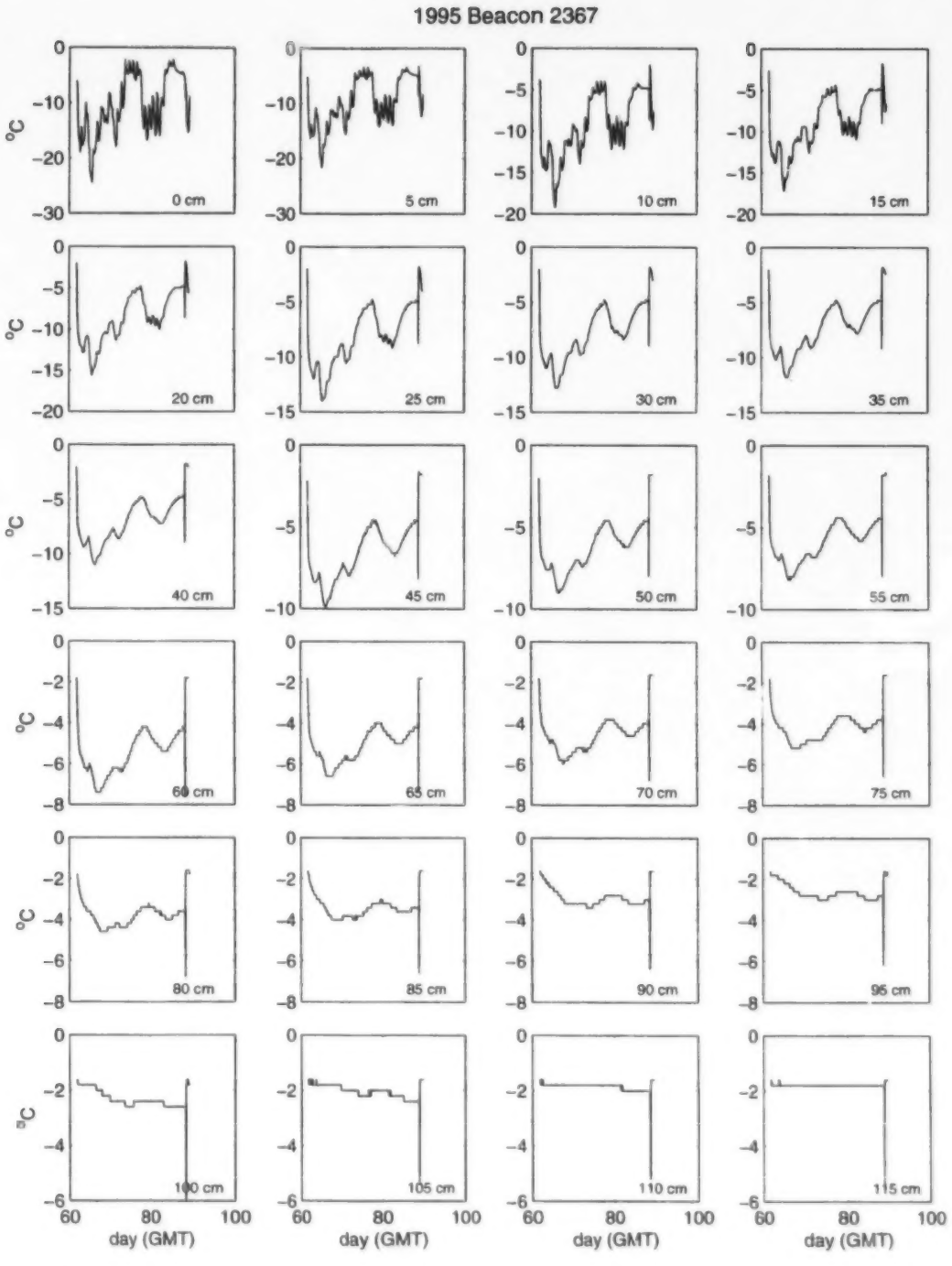



**Figure 11.3.2 1995 data from temperature staff beacon 2367**

## 11.4 1995 GPS data

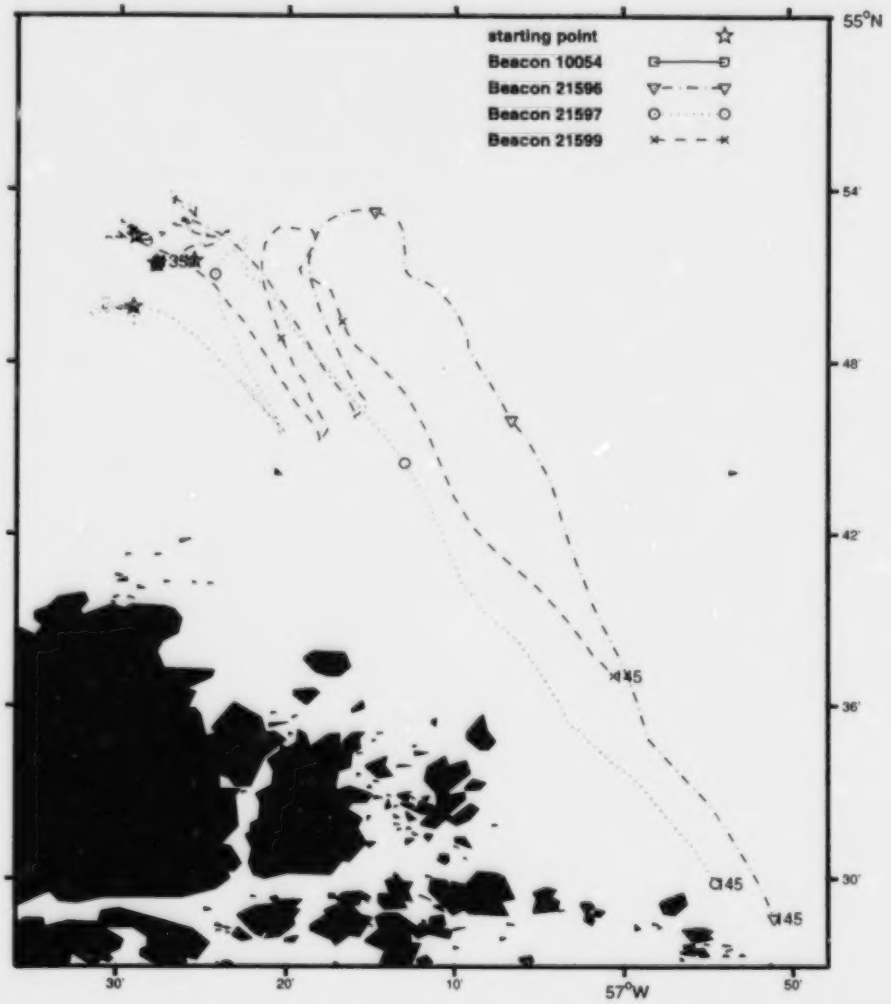



**Figure 11.4.1 1995 GPS beacon tracks for hourly data from beacons 10054, 21599, 21596, and 21597**

# 12 APPENDIX E: 1996 DATA AND PLOTS

## 12.1 1996 Miscellaneous data

**Table 12.1.1 Gulf of St. Lawrence 1996 station data**

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **1**<br>Feb. 27<br>(day 58) | • clear, Light NW<br>• 2°C, 18:40 (GMT) | • 500 m x 500 m<br>• thick<br>• ice soft and wet | • 20 cm of ***freeboard***[♣],<br>• 2nd raft start at 180 cm<br>• 5th hole 45 cm in melt pond | • snow 0.0 psu<br>• surface ice 0.0 psu<br>• 4 holes > 130 cm<br>• 10 cm freeboard |
| **2**<br>Feb. 27<br>(day 58) | • clear, Light NW<br>• 2°C, 20:25 (GMT) | • 500 m x 500 m<br>• first white floe (thick)<br>• covered with slush (15 cm) | • beacon #966 on thick rafted ice (20:25 GMT) | • snow 0.0 psu<br>• 2 holes > 120 cm<br>• 3rd hole 85 cm<br>• 4th hole 95 cm |
| **3**<br>Feb. 28<br>(day 59) | • cloudy, light NW<br>• 2°C, 14:30 (GMT) | • 500 m x 500 m | • calibration floe<br>• 9 bags location plus two lead-up ***bags***[♣♣]<br>• SW end 2 bags,<br>• NE end 3 bags<br>• ***EM***[♣♣♣]passes: NE to SW<br>• beacon #969 out at 14:30 (GMT) on ice >120 cm | • snow 0.0 psu<br>• surface ice 0.0 psu<br>• surface water 30 psu<br>• 17 holes, 10 m apart |

**Ice Holes at Station 3**

| Site # | Distance (m) | Ice (cm) | Freeboard (cm) | Snow (cm) | Snow and Ice (cm) | Comments |
|---|---|---|---|---|---|---|
| 1 | 0 | 45 | 4 | 2 | 47 | 2 bags (SW) |
| 2 | 10 | 46 | 4 | 1 | 47 | |
| 3 | 20 | 44 | 5 | 1 | 45 | |
| 4 | 30 | 51 | 4 | 1 | 52 | |
| 5 | 40 | 57 | 5 | 1 | 58 | |
| 6 | 50 | 45 | 4 | 1 | 46 | |
| 7 | 60 | 120 | 10 | 2 | 122 | beacon 969 |
| 8 | 70 | 60 | 5 | 2 | 62 | |
| 9 | 80 | 54 | 5 | 1 | 55 | |
| 10 | 90 | 51 | 4 | 1 | 52 | |
| 11 | 100 | 55 | 5 | 1 | 56 | |
| 12 | 110 | 61 | 4 | 1 | 62 | |

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♣ freeboard: amount of ice showing above water, as in boating terminology

♣♣ bags: orange garbage bags, full of snow, were used as sites for the helicopter while performing electromagnetic ice thickness measurements (ref. Holladay, J. S. and Moucha. 1998. Electromagnetic/laser Ice Thickness Data from the Labrador Shelf, 1994, Can. contract. Rep. of Hydrogr. and Ocean Sci. No. xxx, vii + 340 p.)

♣♣♣ EM: EM = *electromagnetic probe* for measure of ice thickness (ref. Holladay, J. S. and Moucha. 1998. Electromagnetic/laser Ice Thickness Data from the Labrador Shelf, 1994, Can. contract. Rep. of Hydrogr. and Ocean Sci. No. xxx, vii + 340 p.)

| | Ice Holes at Station 3 | | | | | | |
|---|---|---|---|---|---|---|---|
| | Site # | Distance (m) | Ice (cm) | Freeboard (cm) | Snow (cm) | Snow and Ice (cm) | Comments |
| | 13 | 120 | 52 | 4 | 2 | 54 | |
| | 14 | 130 | 59 | 5 | 1 | 60 | |
| | 15 | 140 | 54 | 4 | 1 | 55 | |
| | 16 | 150 | 59 | 3 | 2 | 61 | |
| | 17 | 160 | 51 | 3 | 1 | 52 | 3 bags (NE) |
| | Mean**** | | 52.8 | 4.25 | 1.4 | 53.2 | |

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **4**<br>Feb. 29<br>(day 60) | • 20 km/h NW, 15:50 (GMT)<br>• flurries, -6°C | • large 2 km x 2 km<br>• hard surface ice with some snow patches | • SE corner of large square<br>• beacon 11249 reported at 15:50 (GMT) | • surface ice 0.0 psu<br>• 10 cm ice 0. 0 psu<br>• ice holes: 35, 33, and 43 cm<br>• 2 cm of freeboard |
| **5**<br>Feb. 29<br>(day 60) | • 20 km/h NW, 16:10 (GMT)<br>• flurries, -6°C | • large 2 km x 2 km<br>• hard surface ice with some snow patches | • SE corner of middle square<br>• beacon 26382 reported 16:10 (GMT) | • surface ice 1.0 psu<br>• 10 cm ice 1.0 psu<br>• ice holes: 37 and 42 cm<br>• 2 cm of freeboard |
| **6**<br>Feb. 29<br>(day 60) | • 5 km/h NW, 16:30 (GMT)<br>• flurries, -2°C | • large 2 km x 2 km<br>• hard surface ice with some snow patches | • SW corner of middle square<br>• beacon 26385 reported 16:30 (GMT) | • surface ice 0.0 psu<br>• 10 cm ice 0.0 psu<br>• ice holes: 39 and 42 cm<br>• 2.5 cm of freeboard |
| **7**<br>Feb. 29<br>(day 60) | • 20 km/h NW, 19:35 (GMT)<br>• flurries, -6°C | • large 1 km x 1 km<br>• hard surface ice with some snow drifts | • NW corner of middle square<br>• beacon 26387 reported 19:35 (GMT) | • surface ice 0.0 psu<br>• 10 cm ice 0.0 psu<br>• ice holes: 35, 60, and 60 cm<br>• 3 cm of freeboard |
| **8**<br>Feb. 29<br>(day 60) | • 20 km/h NW, 20:00 (GMT)<br>• flurries, -6°C | • large 1 km x 1 km<br>• hard surface ice with some snow patches | • NE corner of middle square<br>• beacon 26386 reported 20:00 (GMT) | • surface ice 1.0 psu<br>• 10 cm ice 0.0 psu<br>• ice holes: 48 and 52 cm<br>• 3 cm freeboard |
| **9**<br>Mar. 1<br>(day 61) | • 6 km/h NW, 14:55 (GMT)<br>• clear, -6°C | • small 1 km x 1 km<br>• hard surface ice with some snow patches | • NE corner of small square<br>• beacon 26381 reported 14:55 (GMT) | • surface ice 0.0 psu<br>• 10 cm ice 2.0 psu<br>• ice holes: 47, 46, and 49 cm<br>• 2.5 cm freeboard |

**** excluding site #7 (EM sampled from sites 17 to 1)

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **10**<br>Mar. 1<br>(day 61) | • 6 km/h NW, 14:14 (GMT)<br>• clear, -6°C | • small 1 km x 1 km<br>• hard surface ice with some snow patches | • NW corner of small square<br>• beacon 26384 reported 15:14 (GMT) | • surface ice 0.0 psu<br>• 10 cm ice 2.0 psu<br>• ice holes: 32, 30, and 35 cm<br>• 2 cm freeboard |
| **11**<br>Mar. 1<br>(day 61) | • 6 km/h NW, 15:29 (GMT)<br>• clear, -6°C | • small 1 km x 1 km<br>• hard surface ice with some snow patches | • SE corner of small square<br>• beacon 26377 reported 15:29 (GMT) | • surface ice 0.0 psu<br>• 10 cm ice 0.0 psu<br>• ice holes: 34, 35, and 37 cm<br>• 2 cm freeboard |
| **12**<br>Mar. 1<br>(day 61) | • 6 km/h NW, 19:38 (GMT)<br>• clear, -6°C | • small 1 km x 1 km<br>• hard surface ice with some snow patches | • SW corner of small square<br>• beacon 26383 reported 19:38 (GMT) | • surface ice 0.0 psu<br>• 10 cm ice 1.0 psu<br>• ice holes: 44, 42, and 32 cm<br>• 2 cm freeboard |
| **13**<br>Mar. 2<br>(day 62) | • 6 km/h SW, 16:00 (GMT)<br>• clear, -4°C | • hard surface ice with very few snow patches | • small S-N ridge | • surface and 10 cm ice 0.0 psu both sides of ridge<br>• drainage water in 30 cm ice hole was 42 psu<br>• ridge ice holes: 277, 340, 420, and 410m |

**Calibration Line at Station 13**
**Distances below are measured from the ridge (* = number bags)**

| Distance W (m) | Ice (cm) | Distance W (m) | Ice (cm) | Notes |
|---|---|---|---|---|
| 1 | 191 | 5 | >120 | ** double bags at 40 m W, perpendicular to line |
| * 10 | 115 | * 10 | >120 | ** double bags at 50 m E, parallel to line |
| 15 | 75 | 15 | 20 | |
| * 20 | 74 | * 20 | 40 | |
| 25 | 74 | 25 | 41 | |
| * 30 | 73 | * 30 | 49 | |
| 35 | 72 | 35 | 47 | |
| ** 40 | 51 | * 40 | 48 | |
| 45 | 55 | 45 | 18 | |
| 50 | 33 | ** 50 | 29 | |
| 55 | 30 | 60 | 30 | |
| 60 | 28 | 70 | 30 | |
| 65 | 30 | * 80 | 28 | |
| * 70 | 30 | | | |

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **14**<br>Mar. 3<br>(day 63) | • clear, light SW<br>• 0°C, 18:30 (GMT) | • 500 m x 500 m | • calibration floe #2<br>• 9 bags location plus two lead-up bags<br>• SW end 2 bags, NE end 3 bags<br>• EM passes both ways | • surface ice 0.0 psu<br>• 10 cm ice 2.0 psu<br>• 32 ice holes 5 m apart, 160 cm |

**Ice Holes at Station 14**

| Site # | Distance (m) | Ice (cm) | Freeboard (cm) | Snow (cm) | Snow and Ice (cm) | # of bags |
|---|---|---|---|---|---|---|
| 1 | 0 | 48 | 2 | 2 | 50 | 2 (SW) |
| 2 | 5 | 55 | 2 | 15 | 70 | |
| 3 | 10 | 60 | 3 | 23 | 83 | |
| 4 | 15 | 68 | 3 | 14 | 82 | |
| 5 | 20 | 48 | 0 | 6 | 54 | 1 |
| 6 | 25 | 53 | 2 | 10 | 63 | |
| 7 | 30 | 43 | 0 | 22 | 65 | |
| 8 | 35 | 47 | 0 | 7 | 54 | |
| 9 | 40 | 49 | 2 | 25 | 74 | 1 |
| 10 | 45 | 47 | 2 | 14 | 61 | |
| 11 | 50 | 46 | 1 | 9 | 55 | |
| 12 | 55 | 50 | 1 | 8 | 58 | |
| 13 | 60 | 45 | 2 | 1 | 46 | 1 |
| 14 | 65 | 39 | 2 | 1 | 40 | |
| 15 | 70 | 57 | 3 | 16 | 73 | |
| 16 | 75 | 59 | 4 | 9 | 68 | |
| 17 | 80 | 45 | 1 | 7 | 52 | 1 |
| 18 | 85 | 50 | 2 | 16 | 66 | |
| 19 | 90 | 38 | 0 | 5 | 43 | |
| 20 | 95 | 38 | 0 | 5 | 43 | |
| 21 | 100 | 58 | 2 | 22 | 80 | 1 |
| 22 | 105 | 53 | 0 | 16 | 69 | |
| 23 | 110 | 56 | 1 | 15 | 71 | |
| 24 | 115 | 53 | -1 | 27 | 80 | |
| 25 | 120 | 53 | 2 | 27 | 80 | 1 |
| 26 | 125 | 55 | 2 | 4 | 59 | |
| 27 | 130 | 51 | 1 | 6 | 57 | |
| 28 | 135 | 54 | 1 | 6 | 60 | |
| 29 | 140 | 57 | 1 | 5 | 62 | 1 |
| 30 | 145 | 55 | 1 | 9 | 64 | |
| 31 | 150 | 50 | 1 | 19 | 69 | |
| 32 | 155 | 53 | -1 | 20 | 73 | |
| 33 | 160 | 52 | -3 | 12 | 64 | 2 (NE) |
| | **Mean** | 51.1 | -1.2 | 12.2 | 63.3 | |

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **15**<br>Mar. 5<br>(day 65) | • 28 km/h W, 13:30 (GMT)<br>• clear, -8°C | | • camera crew on board<br>• five bags along 75 m<br>• beacon #2362 out at 13:30 (GMT) | • drainage water in 30 cm ice hole was 42 psu |

**Ice Holes at Station 15**

| Distance West (m) | Ice (cm) | Snow (cm) | Snow and Ice (cm) | # of bags |
|---|---|---|---|---|
| 0 | 142 | 0 | 142 | 1 (W) |
| 10 | 178 | 0 | 178 | |
| 25 | 53 | 7 | 60 | 1 |
| 35 | 57 | 0 | 57 | |
| 45 | 57 | 0 | 57 | |
| 55 | 124 | 0 | 124 | 1 |
| 65 | >300 | 10 | >300 | |
| 80 | 48 | 0 | 48 | 3 |
| 90 | 36 | 0 | 36 | |
| 100 | 29 | 2 | 31 | 1 (E) |
| 110 | 31 | 0 | 31 | |
| 120 | 47 | 0 | 47 | |
| 130 | 42 | 0 | 42 | |
| 140 | 46 | 0 | 46 | |
| 150 | 50 | 0 | 50 | marker bag |

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **16**<br>Mar. 5<br>(day 65) | • clear, 20 km/h W<br>• -6°C 16:00 (GMT) | • large 2 km x 5 km | • 5 bags location plus two lead-up bags<br>• W end 1 bag, E end 3 bags down wind<br>• EM passed over and circled the floe<br>• GPS beacon 26388 on at 16:00 (GMT) | • 0 cm (0 psu)<br>• 5 cm (1 psu)<br>• 15 cm (4 psu)<br>• 25 cm (6 psu)<br>• 16 ice holes 5 m apart, 80 m long |

**Ice Holes at Station 16**

| Site # | Distance (m) | Ice (cm) | Freeboard (cm) | Snow (cm) | Snow and Ice (cm) | # of bags |
|---|---|---|---|---|---|---|
| 1 | 0 | 39 | 2 | 6 | 45 | 2 (W) |
| 2 | 5 | 34 | 2 | 6 | 40 | |
| 3 | 10 | 34 | 3 | 5 | 39 | |
| 4 | 15 | 34 | 0 | 5 | 39 | |
| 5 | 20 | 32 | 0 | 6 | 38 | 1 |
| 6 | 27 | 34 | -1 | 9 | 43 | |
| 7 | 34 | 43 | -1 | 8 | 51 | |
| 8 | 40 | 35 | 1 | 9 | 44 | 1 |
| 9 | 45 | 33 | 2 | 2 | 35 | |
| 10 | 50 | 37 | 3 | 0 | 37 | |
| 11 | 55 | 33 | 3 | 0 | 33 | 3 |
| 12 | 60 | 35 | 4 | 0 | 35 | |
| 13 | 65 | 38 | 2 | 0 | 38 | |
| 14 | 70 | 42 | 3 | 0 | 42 | |
| 15 | 75 | 60 | 6 | 6 | 66 | 3 |
| 16 | 80 | 55 | 0 | 10 | 65 | |
| | **Mean** | 37.8 | 1.7 | 4.5 | 42.3 | |

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **17**<br>Mar. 6<br>(day 66) | • clear, 5 km/h E<br>• -6°C, 17:15 (GMT) | • large 3 km x 5 km | • calibration floe<br>• 5 bags location plus two lead-up bags<br>• W end 2 bags, E end 3 bags, ridge at 100 m due east<br>• EM passed over and circled the floe | • 0 cm (0 psu)<br>• 5 cm (1 psu)<br>• 15 cm (2 psu)<br>• 25 cm (3 psu)<br>• drainage water in ice hole 25 cm deep was 32 psu<br>• 17 ice holes 5 m apart, 80 m long |

**Ice Holes at Station 17**

| Site # | Distance (m) | Ice (cm) | Freeboard (cm) | Snow (cm) | Snow and Ice (cm) | # of bags |
|---|---|---|---|---|---|---|
| 1 | 0 | 32 | 4 | 0 | 32 | 2 (W) |
| 2 | 5 | 29 | 2 | 0 | 29 | |
| 3 | 10 | 32 | 2 | 0 | 32 | |
| 4 | 15 | 32 | 2 | 0 | 32 | |
| 5 | 20 | 30 | 2 | 2 | 32 | 1 |
| 6 | 25 | 32 | 1 | 6 | 38 | |
| 7 | 30 | 33 | 1 | 6 | 39 | |
| 8 | 35 | 32 | 0 | 8 | 40 | |
| 9 | 40 | 32 | -1 | 18 | 50 | 1 |
| 10 | 45 | 29 | -4 | 20 | 49 | |
| 11 | 50 | 31 | -4 | 25 | 56 | |
| 12 | 55 | 32 | -8 | 30 | 62 | |
| 13 | 60 | 39 | 0 | 20 | 59 | 3 |
| 14 | 65 | 38 | -2 | 10 | 48 | |
| 15 | 70 | 38 | 0 | 2 | 40 | |
| 16 | 75 | 34 | 0 | 0 | 34 | |
| 17 | 80 | 46 | 1 | 0 | 46 | 3 (E) |
| | **Mean** | 35.6 | -0.3 | 8.1 | 43.7 | |

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **18**<br>Mar. 7<br>(day 67) | • clear, 5 km/h NE<br>• -8°C, 14:35 (GMT) | • large 3 km x 3 km | • target #1 on Thursday<br>• EM passed over and circled the floe | • 0 cm (0 psu)<br>• 5 cm (2 psu)<br>• 20 cm (5 psu)<br>• 30 cm (6 psu)<br>• 3 ice holes: 38, 32, 35 cm: 8, 8, 10 cm of snow |

| | | | | |
|---|---|---|---|---|
| **19**<br>Mar. 7<br>(day 67) | • clear, 5 km/h NE<br>• -8°C, 18:05 (GMT) | | • young ridge, 2.2 m sail height<br>• over 30 m wide, blocks 45 to 50 cm wide | • block surface and interior salinity were 0.0 psu |

**Table 12.1.2 Labrador Shelf 1996 station data**

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| 1<br>Mar. 10<br>(day 70) | • clear, 35 km/h NW<br>• -15°C, 15:00 GMT | | • calibration line<br>• put out 14 bags, 20 m apart along 260 m line<br>• SW end (Cartwright) 3 bags, NE end (thin ice) 2 bags | |
| Mar. 11<br>(day 71) | | | • morning: obtained ice thickness and snow depths<br>• afternoon: deployed beacons: temp. staff, GPS and pressure at 140 m<br>• at beacons: ice thickness = 102 cm , 110 cm, snow 7 cm, and freeboard 12 cm | at 70 m:<br>• top snow 0 psu<br>• bottom snow 6 psu<br>• 4 cm 3 psu<br>• 20 cm 6 psu<br>• 35 cm 4 psu<br>at 140m:<br>• top snow 0 psu<br>• bottom snow 0 psu<br>• cm 0 psu<br>• 10 cm 3 psu<br>• 20 cm 5 psu<br>• 35 cm 4 psu<br>• 45 cm 4 psu<br>• 60 cm 5 psu.<br>at 180m:<br>• snow (wet) 43 psu<br>at 310 m:<br>• snow 62 psu<br>• 5 cm ice 6 psu |
| Mar. 12<br>(day 72) | | | • ice thickness and ice cores | |
| Mar. 14<br>(day 74) | • 5 km/h W 19:30 GMT<br>• cloudy, 2°C | | • ice thickness south of line<br>• removed the bags | |
| Mar. 15<br>(day 75) | | | • afternoon, salinity sample<br>• more snow since Mar. 11 due to storm on Mar. 12 | at 180 m:<br>• wet snow 18 psu<br>• 5 cm ice 22 psu |
| Mar. 17<br>(day 77) | | | • afternoon, bottom depths, ridge ice thickness<br>• line direction is 25° (offshore) and 205° (inshore) | |
| Mar. 19<br>(day 79) | | | • 15:00 GMT at 140 m recover ice beacons, ice 122 cm | |

**Landfast Calibration Line; EM Stn.: CART#1**

| # Bags | Distance (m) | Snow (cm) | Ice (cm) | Freeboard (cm) | Snow and Ice (cm) | Depth (m) |
|---|---|---|---|---|---|---|
| 1 | -75 | 7 | 111 | 10 | 118 | 31.6 |
| | -70 | 5 | 104 | 7 | 109 | |
| | -65 | 7 | 104 | 8 | 111 | |
| | -60 | 12 | 102 | 6 | 114 | |
| | -55 | 3 | 109 | 7 | 112 | |
| | -50 | 12 | 109 | 8 | 121 | |
| | -45 | 12 | 114 | 12 | 126 | |

| Landfast Calibration Line; EM Stn.: CART#1 | | | | | | |
|---|---|---|---|---|---|---|
| # Bags | Distance (m) | Snow (cm) | Ice (cm) | Freeboard (cm) | Snow and Ice (cm) | Depth (m) |
| | -40 | 13 | 210 | 9 | 223 | |
| | -35 | 7 | 114 | 8 | 121 | |
| | -30 | 5 | 99 | 8 | 104 | |
| | -25 | 3 | 114 | 9 | 117 | |
| | -20 | 7 | 97 | 9 | 104 | |
| | -15 | 8 | 120 | 7 | 128 | |
| | -10 | 8 | 85 | 8 | 93 | |
| | -5 | 3 | 87 | 7 | 90 | |
| 3 | 0 | 8 | 86 | 5 | 94 | 30.2 |
| | 5 | 6 | 80 | | 86 | |
| | 10 | 6 | 108 | 5 | 114 | |
| | 15 | 5 | 98 | 7 | 103 | |
| 1 | 20 | 0 | 137 | 11 | 137 | |
| | 25 | 4 | 102 | 12 | 106 | |
| | 30 | 5 | 90 | 9 | 95 | |
| | 35 | 2 | 76 | | 78 | |
| 1 | 40 | 3 | 70 | 9 | 80 | |
| | 45 | 4 | 75 | | 79 | 30.3 |
| | 50 | 2 | 83 | 10 | 85 | |
| | 55 | 0 | 138 | | 138 | |
| 1 | 60 | 9 | 115 | 7 | 124 | |
| | 65 | 8 | 164 | | 172 | |
| | 70 | 5 | 153 | 12 | 158 | |
| | 75 | 0 | 101 | | 101 | 30.5 |
| | 80 | 4 | 54 | 3 | 58 | |
| | 85 | 2 | 54 | | 56 | |
| | 90 | 3 | 52 | 4 | 55 | |
| | 95 | 3 | 70 | | 70 | |
| | 100 | 5 | 100 | 9 | 105 | |
| | 105 | 0 | 96 | | 96 | |
| | 110 | 5 | 62 | 5 | 67 | |
| | 115 | 8 | 59 | | 68 | |
| | 120 | 6 | 94 | 9 | 100 | |
| | 125 | 6 | 83 | | 83 | |
| | 130 | 6 | 89 | 7 | 95 | |
| | 135 | 6 | 104 | | 110 | |
| | 140 | 6 | 115 | 12 | 127 | beacons |
| | 145 | 5 | 110 | | 110 | 31.0 |
| | 150 | 1 | 108 | 9 | 109 | |
| | 155 | 2 | 93 | 5 | 95 | |
| | 160 | 3-13 | 83 | 8 | 91 | ridge |
| | 165 | 6 | 33 | 1 | 39 | |
| | 170 | 4-6 | 29-33 | 1 | 36 | |
| | 175 | 4 | | | | |
| | 180 | 6 | 23-34 | -3 | 34 | |
| | 185 | 6 | | | | |
| | 190 | 5 | 24 | -3 | 29 | |
| | 195 | 5 | | | | |
| | 200 | 6 | 30 | 0 | 36 | |
| | 205 | 5 | | | | |
| | 210 | 5 | 24 | -2 | 29 | |

| Landfast Calibration Line; EM Stn.: CART#1 | | | | | | |
|---|---|---|---|---|---|---|
| # Bags | Distance (m) | Snow (cm) | Ice (cm) | Freeboard (cm) | Snow and Ice (cm) | Depth (m) |
| | 215 | 4 | | | | |
| | 220 | 4 | 25 | 0 | 29 | |
| | 225 | 4 | | | | |
| | 230 | 4 | 27 | 0 | 31 | |
| | 235 | 3 | | | | |
| | 240 | 3 | 26 | 0 | 29 | |
| | 245 | 4 | | | | |
| | 250 | 4 | 24 | 0 | 28 | |
| | 255 | 6 | | | | |
| | 260 | 4 | 24 | 0 | 28 | |
| | 290 | 4 | 30 | 1 | 34 | |
| | 305 | 2 | 50 | 4 | 52 | small ridge |
| | 310 | 2 | 20 | 0 | 22 | |
| | 315 | 2 | 20 | 0 | 22 | |
| parallel line of ice holes: | | | | | | |
| 10 m E[*] | 170 | 6 | 33 | | 39 | |
| 15 m E | 170 | 9 | 55 | | 64 | |
| 10 m E | 180 | 6 | 34 | | 40 | |
| 15 m E | 180 | 10 | 85 | | 95 | |
| 10 m E | 190 | 5 | 35 | | 41 | |
| 15 m E | 190 | 3 | 39 | | 42 | |
| 20 m E | 190 | 0 | 150 | | 150 | |

**Notes**

- extra ridge ice thickness (160 m): 92, 83, 78, and 100 cm
- ridge (160 m) was 61 cm
  average of 5 = 83 cm
- ice thickness at 140 m besides 125 cm: 102, 110, 122, and 114
  average of 5 at 140 m (beacons) = 115 cm

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **2**<br>Mar. 10<br>(day 70) | • clear, 35 km/h NW<br>• -15°C, 19:08 GMT | • ice thickness: 75, 61, and 35 cm<br>• snow 6-12 cm | • GPS beacon 26379<br>• SW corner of GPS triangle | • 0 cm = 0 psu<br>• 10 cm = 3 psu<br>• 20 cm = 5 psu<br>• 30 cm = 5 psu |
| **3**<br>Mar. 10<br>(day 70) | • clear, 35 km/h NW<br>• -15°C, 19:45 GMT | • ice thickness: 48, 45, and 47 cm<br>• snow 5, 6, and 8 cm | • GPS beacon 26378<br>• ice pressure beacons 1054 and 22195<br>• centre of GPS triangle 1 | • bottom snow = 13 psu<br>• 0 cm ice = 2 psu<br>• 10 cm = 2 psu<br>• 20 cm = 6 psu<br>• 30 cm = 5 psu |
| **4**<br>Mar. 10<br>(day 70) | • clear, 35 km/h NW<br>• -15°C, 20:05 GMT | • ice thickness: 37, 37, and 36 cm<br>• 1 cm of snow | • GPS beacon 26398<br>• N corner of GPS triangle 1 | |

[*] A parallel line of ice holes was drilled because an ice ridge obstructed the line: *10 m* east of calibration line, etc.

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **5**<br>Mar. 10<br>(day 70) | • clear, 35 km/h NW<br>• -15°C, 20:30 GMT | • ice thickness: 47, 49 and 49 cm<br>• snow 5, 5, and 6 cm | • GPS beacon 26376<br>• SE corner of GPS triangle 1 | |
| **6**<br>Mar. 12<br>(day 72) | • clear, 5 km/h NW<br>• -6°C, 19:30 GMT | • ice thickness: 33, 33, and 33 cm<br>• snow 1, 1, and 1 cm | • GPS beacon 26374<br>• ice pressure beacons 1052 and 22196<br>• centre of GPS triangle 2 | • snow 13 psu<br>• 0 cm ice 2 psu<br>• 10 cm = 2 psu<br>• 20 cm = 6 psu<br>• 30 cm = 5 psu |
| **7**<br>Mar. 12<br>(day 72) | • clear, 5 km/h NW<br>• -6°C, 19:40 GMT | • ice thickness: 84, 97, and 82 cm<br>• snow 25, 22, and 23 cm | • GPS beacon 26366<br>• N corner of triangle 2 | |
| **8**<br>Mar. 12<br>(day 72) | • clear, 5 km/h NW<br>• -6°C, 20:29 GMT | • ice thickness: 38, 38, 43, cm<br>• snow 1, 1, and 2 cm | • GPS beacon 26370<br>• SE corner of triangle 2 | |
| **9**<br>Mar. 12<br>(day 72) | • clear, 5 km/h NW<br>• -6°C 20:45 GMT | • ice thickness: 34, 35, and 34 cm<br>• snow 2, 2, and 2 cm | • GPS beacon 26368<br>• SW corner of triangle 2 | |
| **Table Bay 14.4**<br>Mar. 14<br>(day 74) | • 5 km/h W, 14:20 GMT<br>• cloudy, 2°C | • black, landfast ice<br>• ice thickness: 75, 82, and 92 cm<br>• snow 3,3, and 3 cm | • 28.5 m water depth | • top snow 0 psu<br>• bottom snow 0 psu<br>• 3 cm ice 0 psu<br>• 10 cm = 1 psu |
| **Table Bay 14.5**<br>Mar. 14<br>(Day 74) | • 5 km/h W, 14:50 GMT<br>• cloudy, 2°C | • ice thickness: 20 , 21, and 20 cm<br>• snow bumps 1 m apart, 4-5 cm high | • bright, thin, landfast ice | • top snow 25 psu<br>• bottom snow 25 psu<br>• 5 cm ice 7 psu |
| **Table Bay 14.6**<br>Mar. 14<br>(day 74) | • 5 km/h W, 15:20 GMT<br>• cloudy, 2°C | • ice thickness: 37, 39, and 38 cm<br>• snow 10 ,11, and 10 cm | • black, landfast ice | • top snow 14 psu<br>• bottom snow 22 psu<br>• 5 cm ice 14 psu |
| **Table Bay 14.7**<br>Mar. 14<br>(day 74) | • 5 km/h W, 15:45 GMT<br>• cloudy, 2°C, | • ice thickness: 14, 14, and 14 cm<br>• snow, sawtooth pattern 10 cm | | • top snow 27 psu<br>• bottom snow 20 psu<br>• surface ice 24 psu |

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **15.8** Mar. 15 (day 75) | • 5 km/h SE, 14:10 GMT<br>• cloudy, 2°C | • ice thickness: 26, 26, and 26 cm<br>• same ice as 310 m calibration line | • N of calibration line<br>• water depth 28 m | • snow slush 7 psu<br>• 5 cm ice 6 psu |
| **15.9** Mar. 15 (day 75) | • 5 km/h SE, 14:25 GMT<br>• cloudy, 2°C | • ice thickness: 39, 42, and 55 cm<br>• slush snow cover with white snow bumps 2 m apart | • NW of calibration line, not so bright area on image<br>• inland from station 15.8 | • snow tops (dry) 5 psu<br>• wet snow 8 psu<br>• 5 cm ice 16 psu<br>• 10 cm ice 13 psu |
| **15.10** Mar. 15 (day 75) | • 5 km/h SE, 14:45 GMT<br>• cloudy, 2°C | • ice thickness: 65, 65, and 64 cm<br>• snow depths: 8, 10, and 10 cm | • strand station<br>• dull, landfast ice area on image | • snow top 0 psu<br>• snow bottom 8 psu<br>• 3 cm ice 2 psu<br>• 0 cm = 2 psu<br>• 20 cm = 5 psu<br>• 30 cm = 6 psu |
| **15.11** Mar. 15 (day 75) | • 5 km/h SE, 15:05 GMT<br>• cloudy, 2°C | • ice thickness: 58, 59, and 60 cm<br>• snow depths; 5, 4, and 3 cm | • inside break from thick to thin ice<br>• E of Huntingdon Island<br>• dull, landfast area on image | • snow top 0 psu<br>• snow bottom 3 psu<br>• 3 cm ice 0 psu<br>• 5 cm = 4 psu<br>• 15 cm = 5 psu |
| **15.12** Mar. 15 (day 75) | • 5 km/h SE, 15:15 GMT<br>• cloudy, 2°C | • ice thickness:<br>• 14, 15, and 16 cm<br>• snow depths: 2, 2, and 2 cm | • outside break from thick to thin ice<br>• E of Huntingdon Island<br>• bright band against thick ice | • snow wet 16 psu<br>• surface ice 9 psu |
| **15.13** Mar. 15 (day 75) | • 5 km/h SE, 17:30 GMT<br>• cloudy, 2°C | | • 2nd calibration line<br>• E of Huntingdon Island<br>• dull, landfast area on image<br>• in line but S of stations 15.11 and 15.12<br>• 9 ice thickness and snow depths | • top snow 2 psu<br>• bottom snow 0 psu<br>• 3 cm ice 0 psu<br>• 10 cm = 7 psu<br>• 20 cm = 6 psu |

**Second Calibration Line at Station 15.13**

| # Bags | Distance (m) | Snow (cm) | Ice (cm) | Freeboard (cm) | Snow and Ice (cm) |
|---|---|---|---|---|---|
| | -20 | 0-14 | 78 | 5 | 85 |
| 1 | 0 | 17 | 90 | 8 | 107 |
| | 20 | 0-5 | 90 | 8 | 95 |
| | 40 | 7 | 90 | 9 | 97 |
| | 60 | 6 | 90 | 6 | 96 |
| | 80 | 11 | 94 | 6 | 105 |
| | 100 | 7 | 122 | 9 | 129 |
| 1 | 120 | 22 | 65 | 0 | 87 |
| | 140 | 16 | 60 | 2 | 76 |
| | 150 | 7 | 68 | | 75 |
| | 180 | 7 | 65 | | 72 |
| | 210 | 7 | 69 | | 76 |

| | Second Calibration Line at Station 15.13 | | | | |
|---|---|---|---|---|---|
| # Bags | Distance (m) | Snow (cm) | Ice (cm) | Freeboard (cm) | Snow and Ice (cm) |
| | 240 | 7 | 68 | | 75 |
| | 270 | 7 | 64 | | 71 |
| | 300 | 7 | 68 | | 75 |
| | 330 | 7 | 61 | | 68 |
| | 360 | 7 | 62 | | 69 |
| | **Notes**<br>• snow thickness for 50-350 were taken as an average of the previous thicker ice –20 m–100 m<br>• old holes were not found, but thickness were very consistent as EM data indicated<br>• March 17 returned to this calibration line | | | | |

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **18.1**<br>Mar. 18<br>(day 78) | • 10 km/h SE, 14:00 GMT<br>• cloudy, 2°C | • small, thick but soft<br>• ice thickness 117 cm<br>• 10 m x 10 m | • off Spotted Island<br>• ARGOS beacon 975 deployed at about 14:00 GMT | |
| **CTD 4**<br>Mar. 19<br>(day 79) | • km/h SW, 13:15 GMT<br>• clear, -4°C | • small, thick floe<br>• thick ice on both sides of floe<br>• thin 30 cm in middle | • 60 km off Grady Island<br>• 175 m water depth | |
| **CTD 5**<br>Mar. 19<br>(day 79) | • 15 km/h SW, 13:50 GMT<br>• clear, -4°C | • small floe<br>• thick (> 200 cm) | • 40 km off Grady Island<br>• 150 m water depth<br>• CTD done from the edge<br>• ARGOS beacon 2365 deployed | |
| **CTD 6**<br>Mar. 19<br>(day 79) | • 15 km/h SW, 14:30 GMT<br>• clear, -4°C | • small, thin floe<br>• ice 39 cm thick | • 20 km off Grady Island<br>• 92 m water depth | |

## 12.2 1996 Pressure data

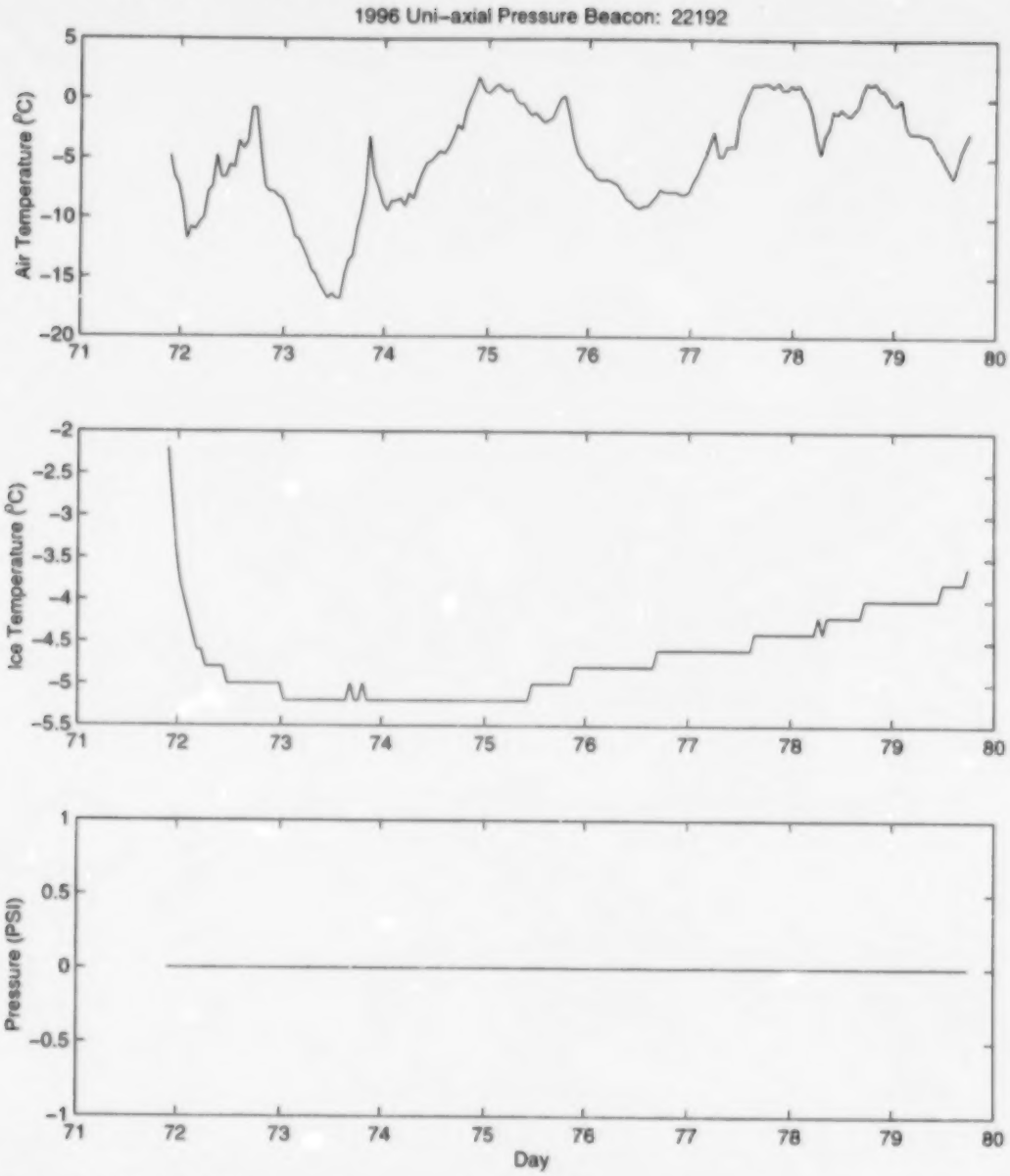


**Figure 12.2.1 1996 data from uni-axial pressure beacon 22192**

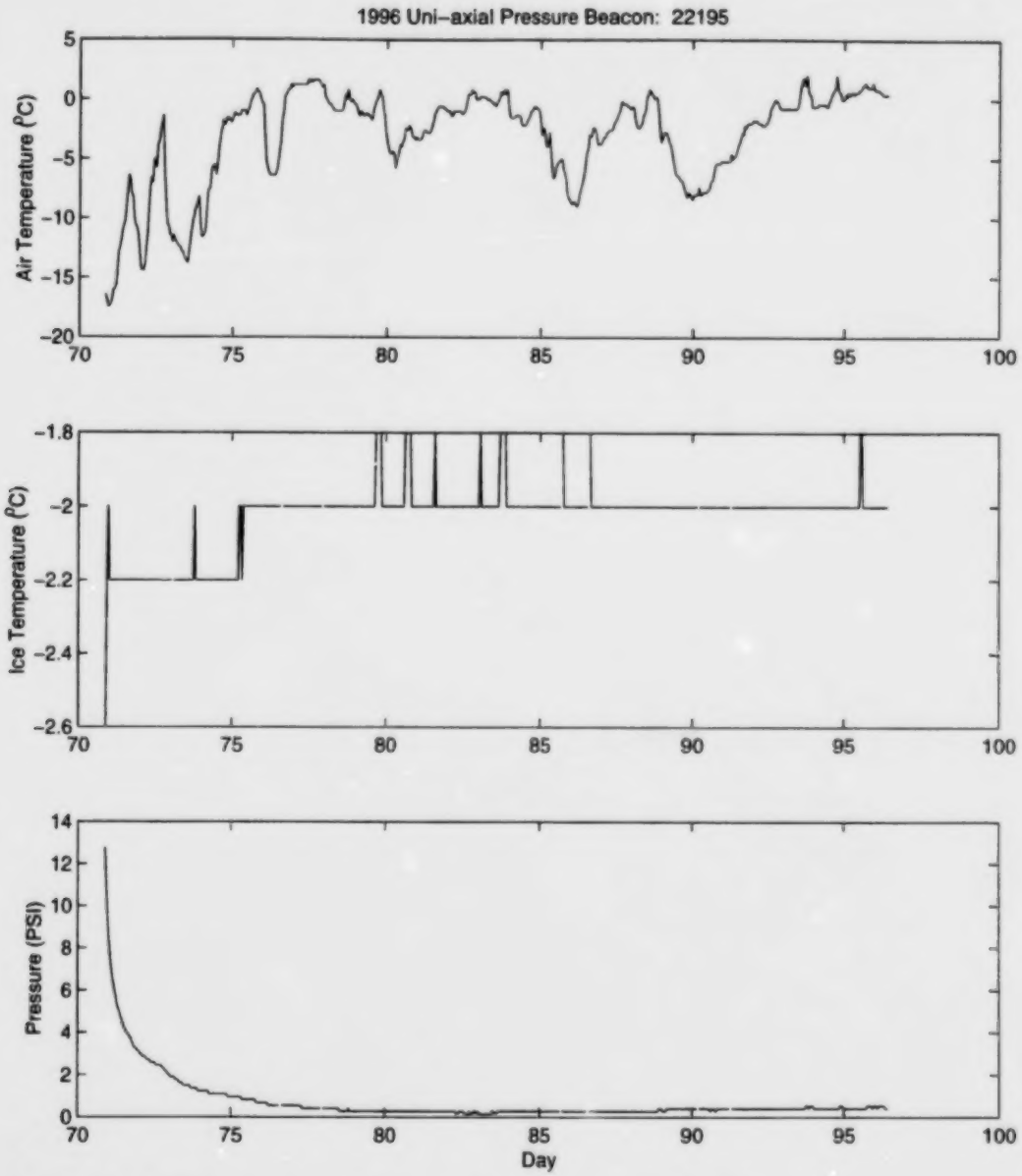


**Figure 12.2.2 1996 data from uni-axial pressure beacon 22195**

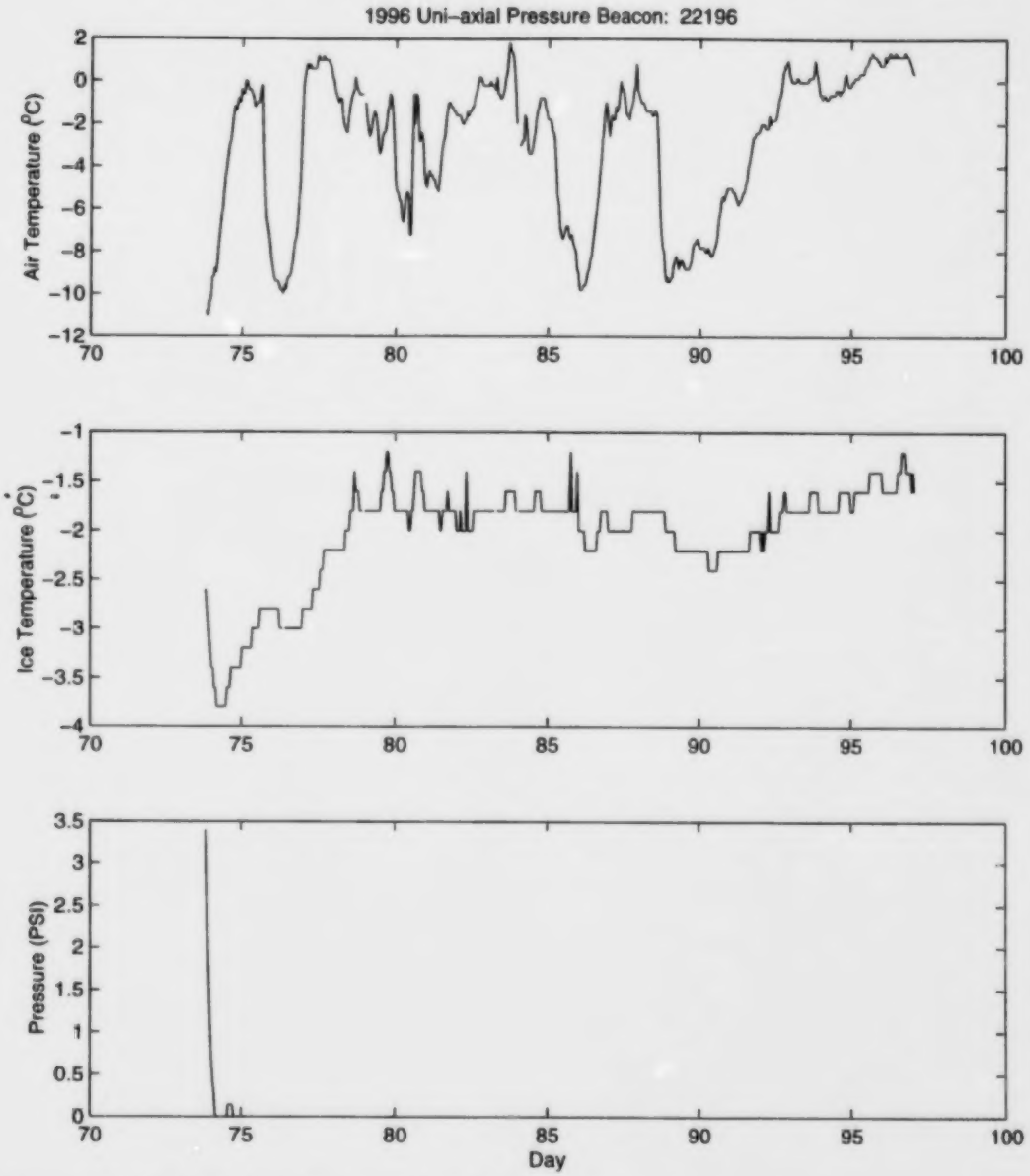


**Figure 12.2.3 1996 data from uni-axial pressure beacon 22196**

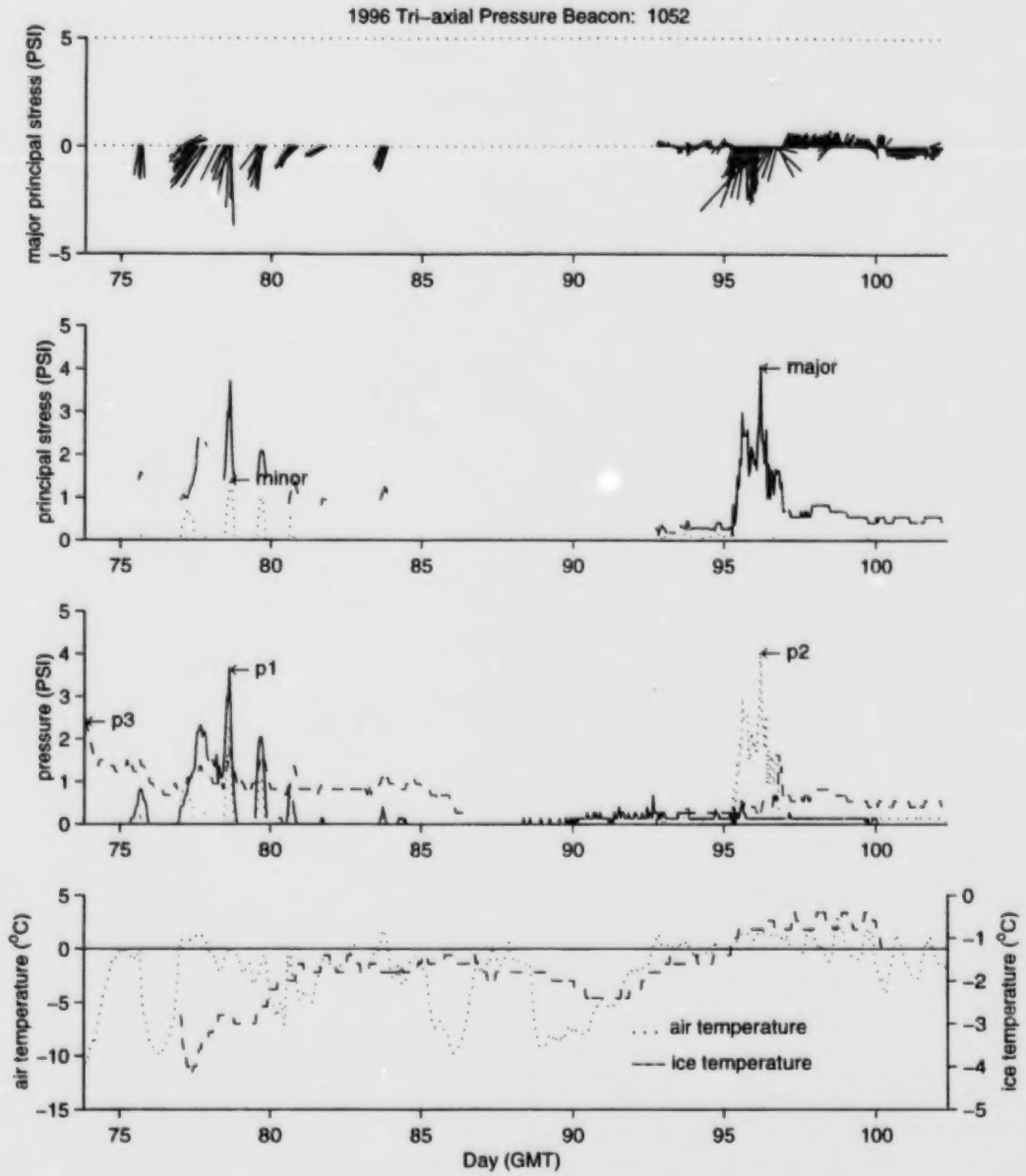


**Figure 12.2.4 1996 data from tri-axial pressure beacon 1052**

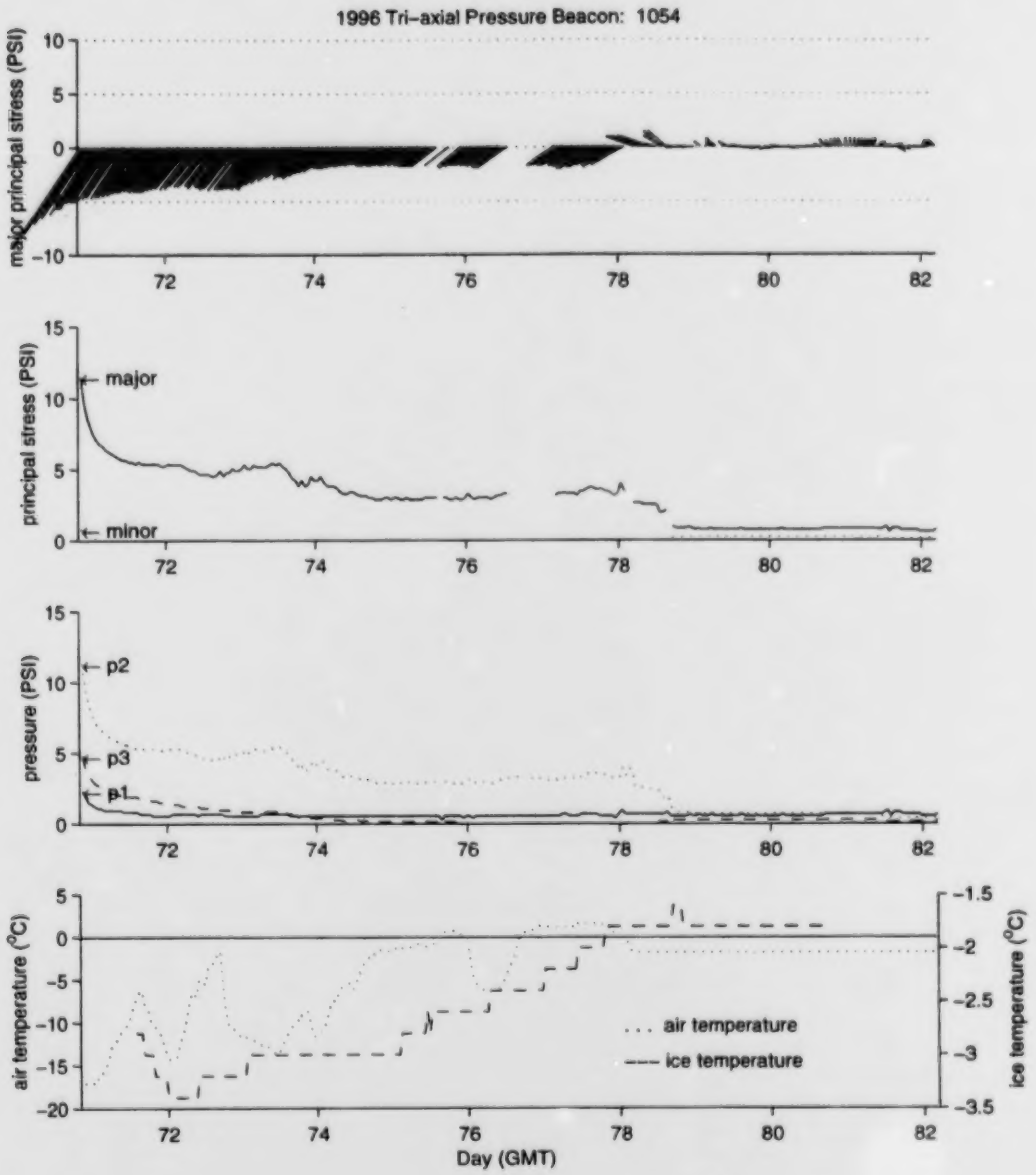


**Figure 12.2.5 1996 data from tri-axial pressure beacon 1054**

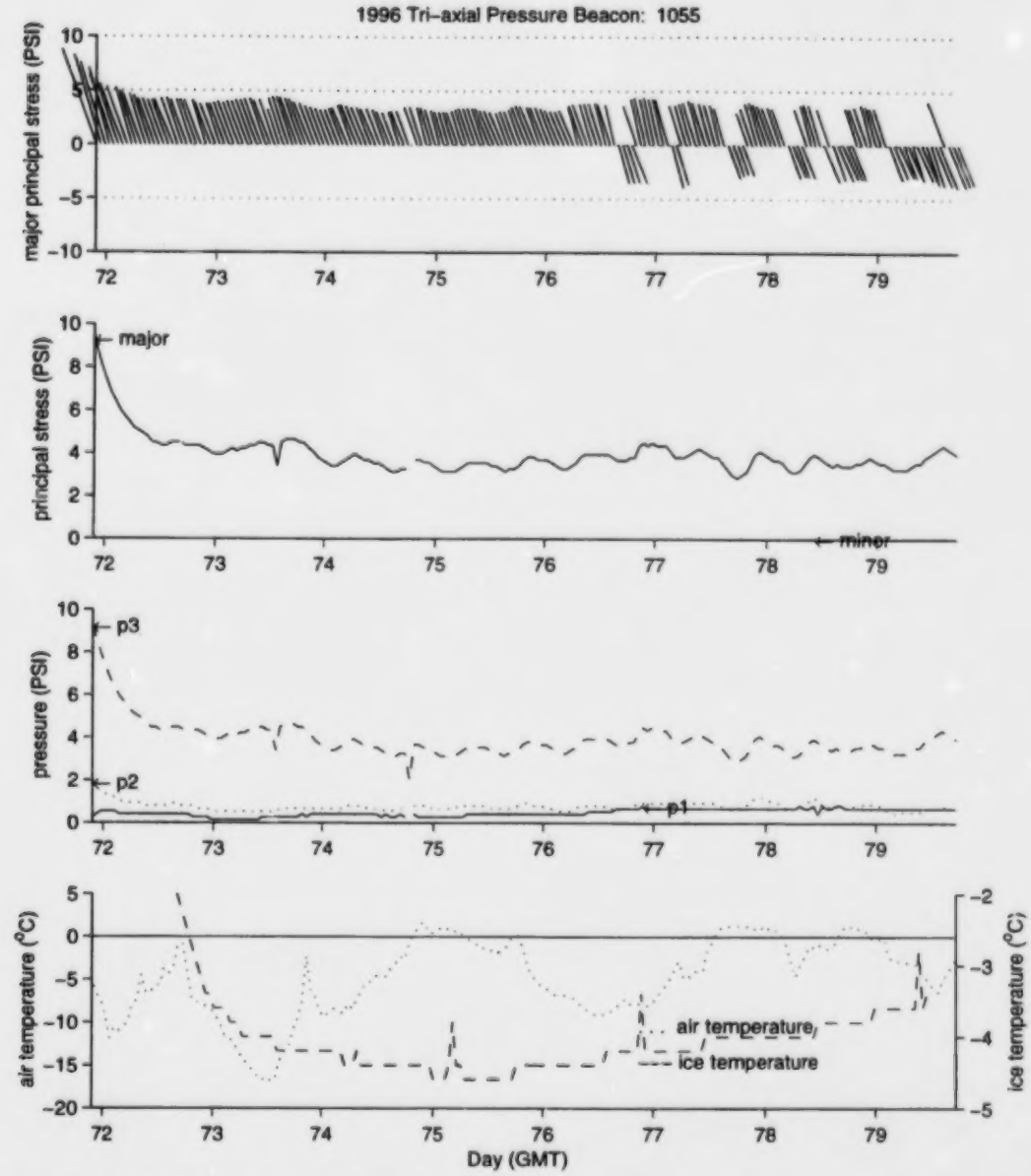


**Figure 12.2.6 1996 data from tri-axial pressure beacon 1055**

## 12.3 1996 Temperature staff data

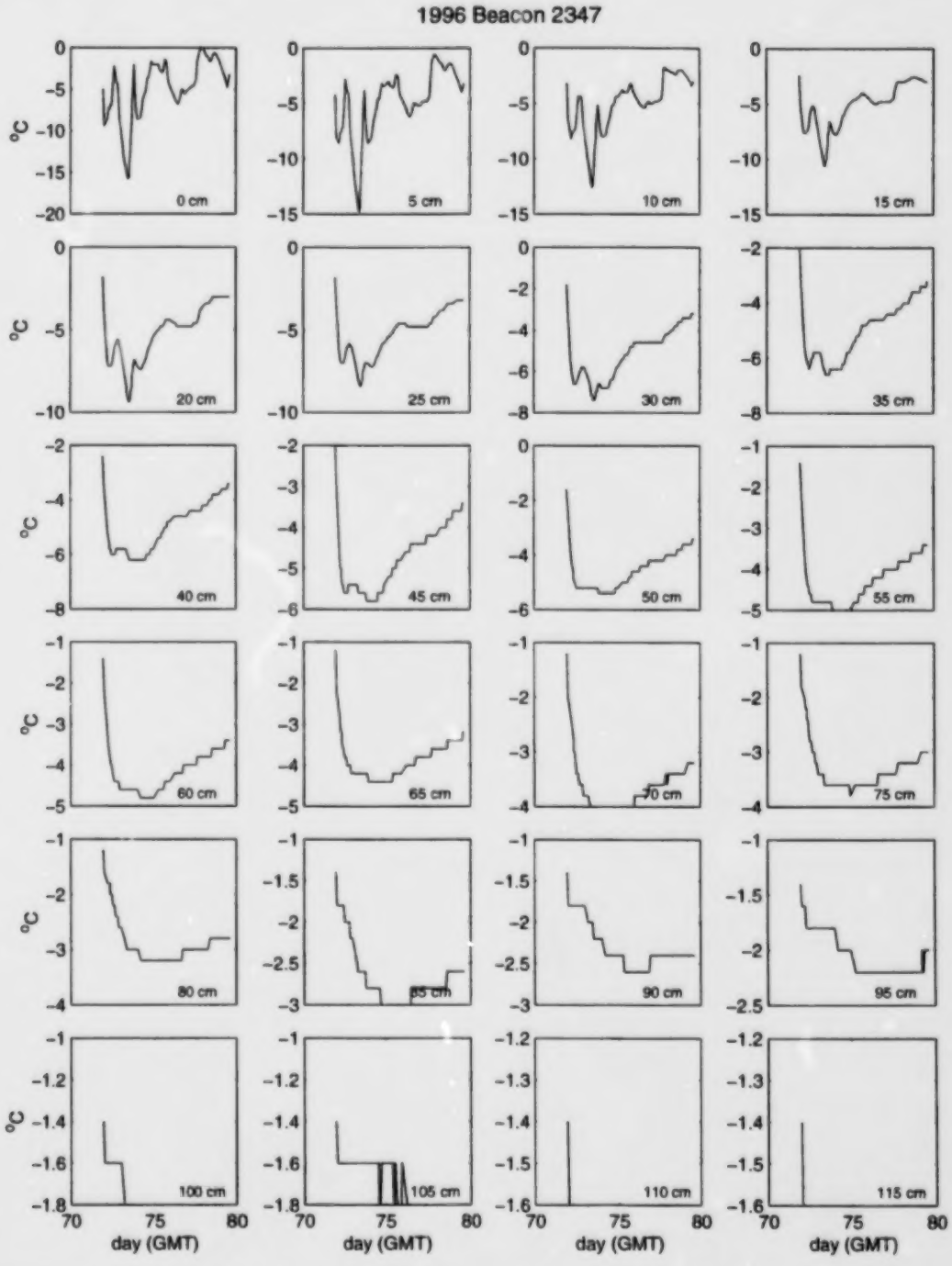


**Figure 12.3.1 1996 data from temperature staff beacon 2347**

## 12.4 1996 GPS data

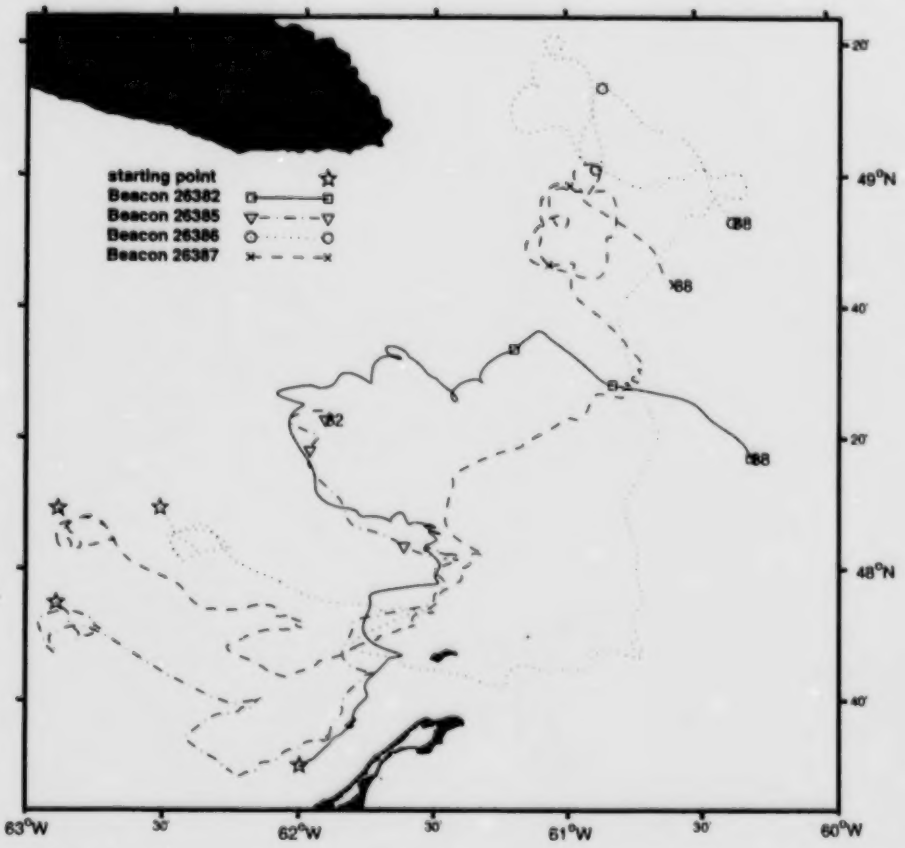


**Figure 12.4.1 1996 GPS beacon tracks for hourly data from beacons 26382, 26385, 26386, and 26387 in the Gulf of St. Lawrence**

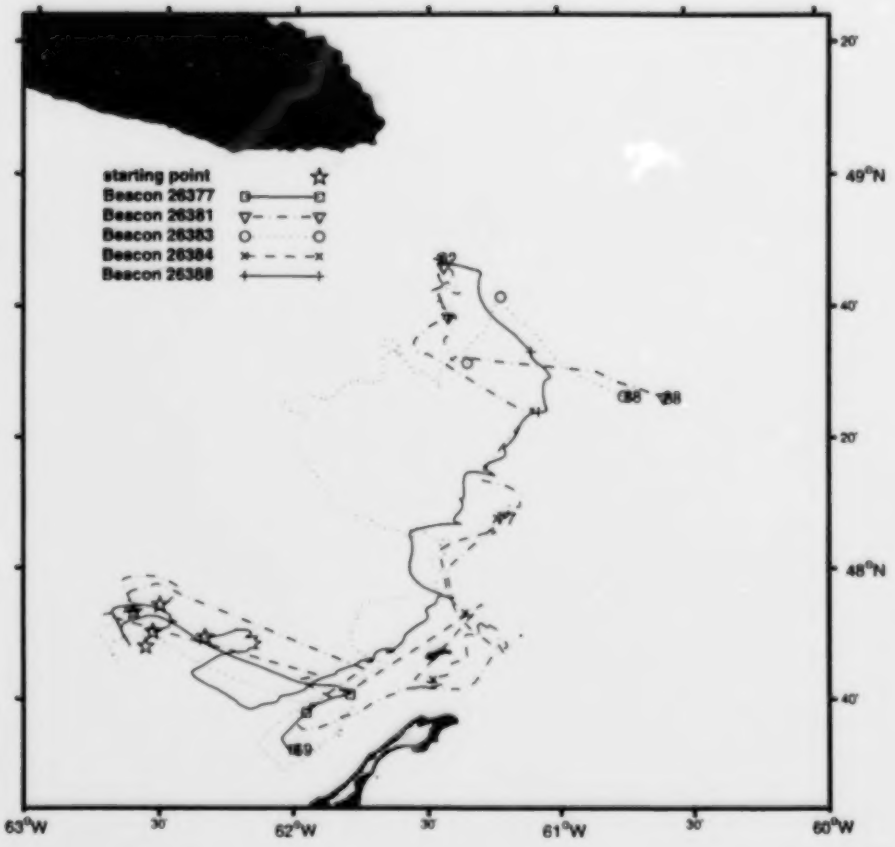


**Figure 12.4.2 1996 GPS beacon tracks for hourly data from beacons 26377, 26381, 26383, 26384, and 26388 in the Gulf of St. Lawrence**

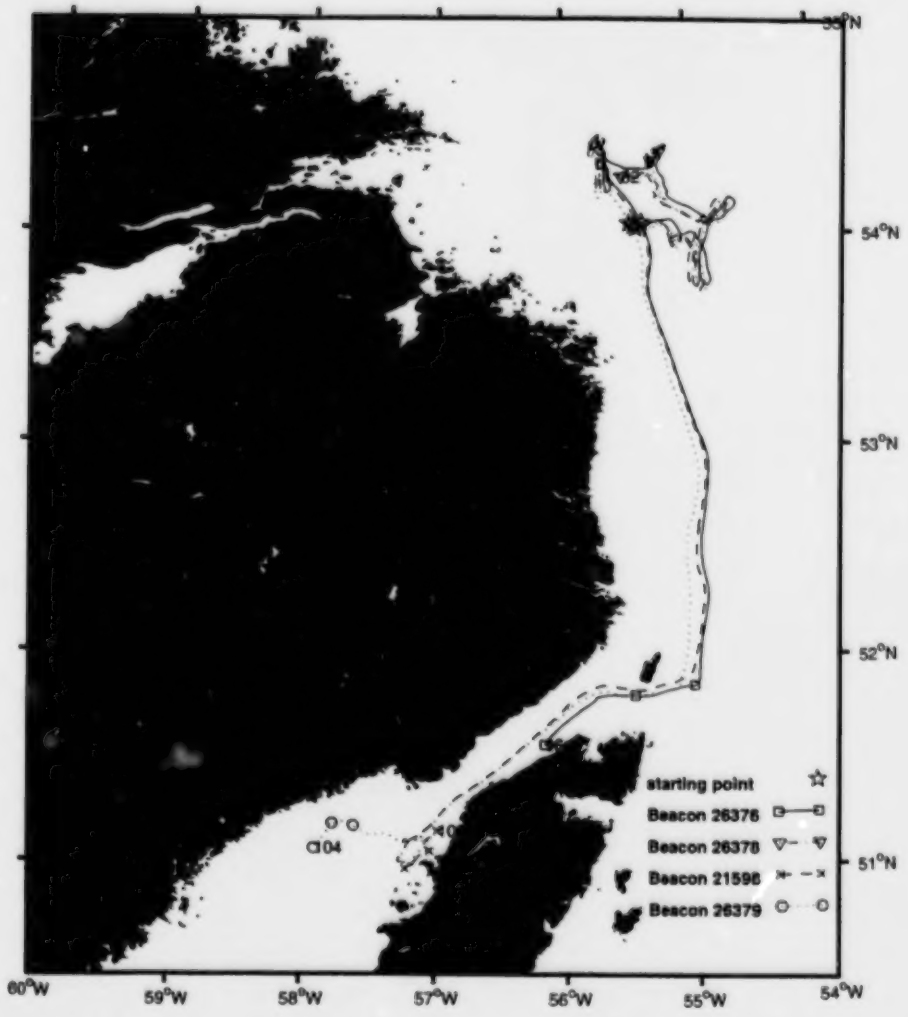


**Figure 12.4.3 1996 GPS beacon tracks for hourly data from beacons 26376, 26378, 26379, and 21598 off Labrador**

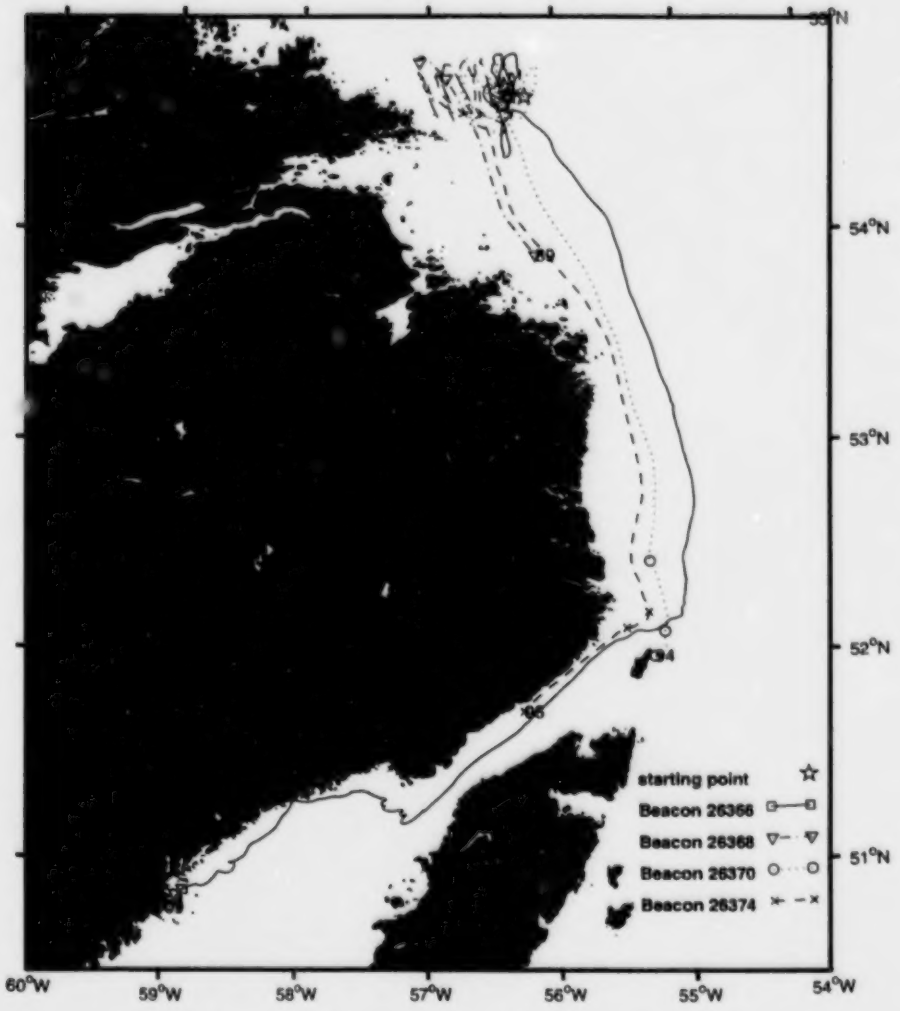


**Figure 12.4.4 1996 GPS beacon tracks for hourly data from beacons 26366, 26368, 26370, and 26374 off Labrador**

## 12.5 1996 CTD data

### 12.5.1 1996 station 1

FILE SPECIFICATION = CTD_95914_1P_1_DN.ODF
CRUISE NUMBER = 95914
CRUISE NAME = HAMILTON BANK
CRUISE DESCRIPTION = LABRADOR RADAR SAT VAL
START DATE TIME = 12-MAR-1996 14:06:33.50
END DATE TIME = 12-MAR-1996 14:11:16.25
INITIAL LATITUDE = 54.1473
INITIAL LONGITUDE = -54.9623
END LATITUDE = 54.1473
END LONGITUDE = -54.9623
MIN DEPTH = 1.5343
MAX DEPTH = 167.4076
SAMPLING INTERVAL = 0.00000000
SOUNDING = 175.0
EVENT COMMENTS = 28-MAR-1996 09:32:57 CAST 01 ICE THICKNESS 0.5 M

**Table 12.5.1 1996 CTD station 1, downcast data**

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 5 | -1.7926 | 34.1249 | -1.7927 | 27.4694 |
| 10 | -1.7925 | 34.1231 | -1.7926 | 27.4678 |
| 15 | -1.7924 | 34.1221 | -1.7926 | 27.467 |
| 20 | -1.7921 | 34.1215 | -1.7924 | 27.4665 |
| 25 | -1.7918 | 34.1207 | -1.7922 | 27.4659 |
| 30 | -1.7916 | 34.1204 | -1.7921 | 27.4656 |
| 35 | -1.7912 | 34.12 | -1.7918 | 27.4653 |
| 40 | -1.7911 | 34.12 | -1.7918 | 27.4653 |
| 45 | -1.7908 | 34.12 | -1.7916 | 27.4653 |
| 50 | -1.7906 | 34.1201 | -1.7915 | 27.4654 |
| 55 | -1.7905 | 34.1202 | -1.7915 | 27.4655 |
| 60 | -1.7905 | 34.1203 | -1.7916 | 27.4655 |
| 65 | -1.7904 | 34.1202 | -1.7916 | 27.4655 |
| 70 | -1.7901 | 34.1205 | -1.7913 | 27.4657 |
| 75 | -1.7895 | 34.1207 | -1.7909 | 27.4659 |
| 80 | -1.7857 | 34.1225 | -1.7872 | 27.4672 |
| 85 | -1.781 | 34.125 | -1.7827 | 27.4691 |
| 90 | -1.737 | 34.1349 | -1.7388 | 27.4759 |
| 95 | -1.6004 | 34.2036 | -1.6024 | 27.528 |
| 100 | -1.5173 | 34.2489 | -1.5194 | 27.5624 |
| 105 | -1.4464 | 34.2804 | -1.4487 | 27.5858 |
| 110 | -1.3724 | 34.3155 | -1.375 | 27.6119 |
| 115 | -1.2817 | 34.3367 | -1.2845 | 27.6261 |
| 120 | -1.2146 | 34.3662 | -1.2175 | 27.6476 |
| 125 | -1.2121 | 34.4084 | -1.2153 | 27.6819 |
| 130 | -1.1603 | 34.4462 | -1.1636 | 27.7107 |
| 135 | -1.0757 | 34.4765 | -1.0793 | 27.7321 |
| 140 | -1.037 | 34.4931 | -1.0407 | 27.7441 |
| 145 | -1.0223 | 34.5110 | -1.0262 | 27.7581 |
| 150 | -1.011 | 34.5377 | -1.0151 | 27.7793 |

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 155 | -0.8377 | 34.5577 | -0.8421 | 27.7886 |
| 160 | -0.4208 | 34.6454 | -0.426 | 27.8413 |
| 165 | -0.351 | 34.6935 | -0.3565 | 27.8769 |

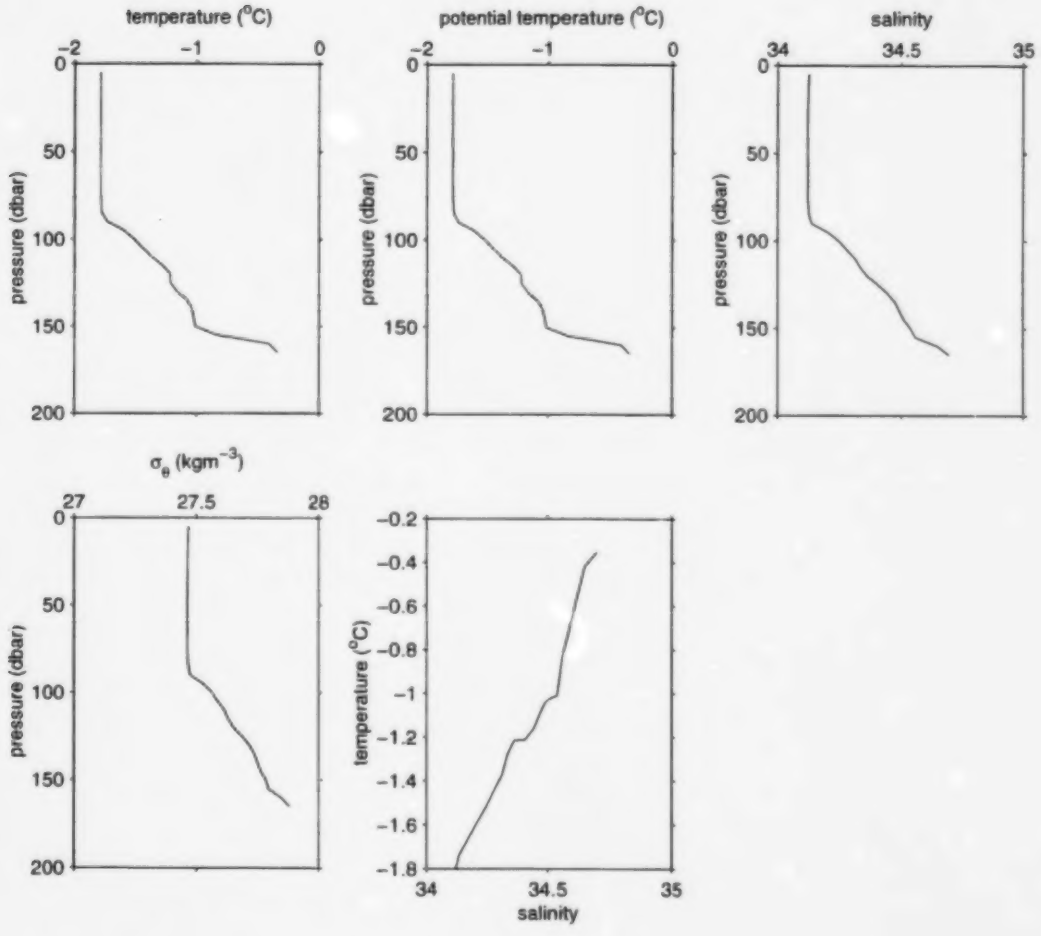


**Figure 12.5.1 1996 station 1 CTD and T-S profiles, downcast**

### 12.5.2 1996 station 2

FILE SPECIFICATION = CTD_95914_2P_1_DN.ODF
CRUISE NUMBER = 95914
CRUISE NAME = HAMILTON BANK
CRUISE DESCRIPTION = LABRADOR RADAR SAT VAL
START DATE TIME = 12-MAR-1996 14:53:17.50
END DATE TIME = 12-MAR-1996 14:58:47.50
INITIAL LATITUDE = 54.0578
INITIAL LONGITUDE = -55.0985
END LATITUDE = 54.0578
END LONGITUDE = -55.0985
MIN DEPTH = 9.6744
MAX DEPTH = 157.7169
SAMPLING INTERVAL = 0.00000000
SOUNDING = 160.0
EVENT COMMENTS = 28-MAR-1996 12:59:56 CAST 02 ICE THICKNESS 0.5 M
EVENT COMMENTS = 28-MAR-1996 13:15:31 PRESSURE OFFSET OF 1.284 ADDED

**Table 12.5.2 1996 CTD station 2, downcast data**

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 10 | 14.52 | 14.52 | 14.52 | 14.52 |
| 15 | -1.7843 | 34.1476 | -1.7846 | 27.4875 |
| 20 | -1.7829 | 34.1406 | -1.7832 | 27.4818 |
| 25 | -1.7824 | 34.1383 | -1.7828 | 27.4799 |
| 30 | -1.7812 | 34.1366 | -1.7817 | 27.4785 |
| 35 | -1.7825 | 34.1383 | -1.7831 | 27.48 |
| 40 | -1.7834 | 34.1391 | -1.7841 | 27.4806 |
| 45 | -1.7831 | 34.1386 | -1.7839 | 27.4802 |
| 50 | -1.7833 | 34.1388 | -1.7842 | 27.4804 |
| 55 | -1.7831 | 34.1389 | -1.7841 | 27.4804 |
| 60 | -1.7833 | 34.14 | -1.7844 | 27.4814 |
| 65 | -1.7827 | 34.1398 | -1.7839 | 27.4812 |
| 70 | -1.7822 | 34.1403 | -1.7835 | 27.4816 |
| 75 | -1.7824 | 34.1398 | -1.7838 | 27.4812 |
| 80 | -1.7823 | 34.1397 | -1.7838 | 27.4811 |
| 85 | -1.7806 | 34.14 | -1.7822 | 27.4813 |
| 90 | -1.7776 | 34.1404 | -1.7793 | 27.4816 |
| 95 | -1.7635 | 34.1422 | -1.7653 | 27.4826 |
| 100 | -1.6932 | 34.1441 | -1.6952 | 27.4822 |
| 105 | -1.3191 | 34.1902 | -1.3216 | 27.5081 |
| 110 | -1.0802 | 34.2879 | -1.083 | 27.5794 |
| 115 | -0.9754 | 34.33 | -0.9784 | 27.6095 |
| 120 | -0.965 | 34.3817 | -0.9682 | 27.6511 |
| 125 | -1.0144 | 34.4194 | -1.0177 | 27.6835 |
| 130 | -1.0747 | 34.4446 | -1.078 | 27.7063 |
| 135 | -1.0733 | 34.4616 | -1.0768 | 27.7199 |
| 140 | -0.9738 | 34.4986 | -0.9777 | 27.7462 |
| 145 | -0.8353 | 34.5131 | -0.8394 | 27.7524 |
| 150 | -0.4255 | 34.6336 | -0.4303 | 27.8319 |
| 155 | -0.2578 | 34.7393 | -0.2631 | 27.9093 |

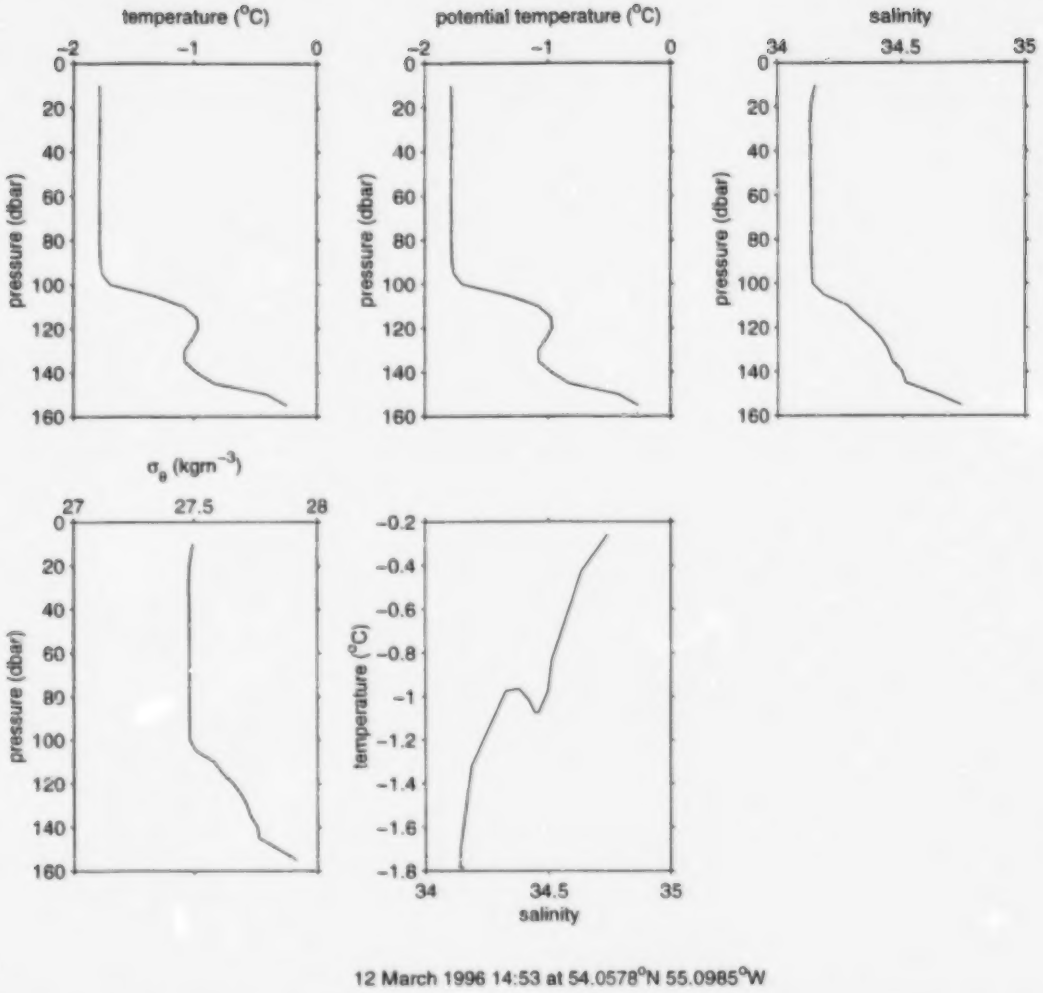


**Figure 12.5.2 1996 station 2 CTD and T-S profiles, downcast**

### 12.5.3 1996 station 3

FILE SPECIFICATION = CTD_95914_3P_1_DN.ODF
CRUISE NUMBER = 95914
CRUISE NAME = HAMILTON BANK
CRUISE DESCRIPTION = LABRADOR RADAR SAT VAL
START DATE TIME = 12-MAR-1996 15:29:21.25
END DATE TIME = 12-MAR-1996 15:33:01.50
INITIAL LATITUDE = 53.9983
INITIAL LONGITUDE = -55.3382
END LATITUDE = 53.9983
END LONGITUDE = -55.3382
MIN DEPTH = 11.8103
MAX DEPTH = 140.5569
SAMPLING INTERVAL = 0.00000000
SOUNDING = 138.0
EVENT COMMENTS = 28-MAR-1996 13:45:38 CAST 03 ICE THICKNESS 0.4 M
EVENT COMMENTS = 28-MAR-1996 13:57:54 PRESSURE OFFSET OF 1.379 ADDED

**Table 12.5.3 1996 CTD station 3, downcast data**

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 15 | -1.7977 | 34.1438 | -1.7979 | 27.4847 |
| 20 | -1.7976 | 34.1391 | -1.7979 | 27.4809 |
| 25 | -1.7975 | 34.1356 | -1.7979 | 27.4781 |
| 30 | -1.797 | 34.1365 | -1.7975 | 27.4788 |
| 35 | -1.7949 | 34.1438 | -1.7955 | 27.4848 |
| 40 | -1.7935 | 34.146 | -1.7942 | 27.4866 |
| 45 | -1.7928 | 34.1466 | -1.7936 | 27.487 |
| 50 | -1.7919 | 34.1472 | -1.7928 | 27.4875 |
| 55 | -1.7913 | 34.148 | -1.7923 | 27.488 |
| 60 | -1.7905 | 34.1488 | -1.7916 | 27.4887 |
| 65 | -1.7898 | 34.1494 | -1.791 | 27.4892 |
| 70 | -1.7896 | 34.1497 | -1.7909 | 27.4894 |
| 75 | -1.7894 | 34.1499 | -1.7907 | 27.4896 |
| 80 | -1.7892 | 34.1504 | -1.7907 | 27.4899 |
| 85 | -1.7885 | 34.1506 | -1.7901 | 27.4901 |
| 90 | -1.7877 | 34.1508 | -1.7894 | 27.4904 |
| 95 | -1.7821 | 34.1526 | -1.784 | 27.4915 |
| 100 | -1.7724 | 34.157 | -1.7743 | 27.4949 |
| 105 | -1.7578 | 34.1631 | -1.7598 | 27.4995 |
| 110 | -1.7284 | 34.1797 | -1.7306 | 27.5122 |
| 115 | -1.6719 | 34.21 | -1.6742 | 27.5353 |
| 120 | -1.5853 | 34.2554 | -1.5878 | 27.5697 |
| 125 | -1.3184 | 34.3492 | -1.3214 | 27.6374 |
| 130 | -1.0298 | 34.4492 | -1.0333 | 27.7082 |
| 135 | -0.5218 | 34.5902 | -0.526 | 27.8011 |
| 140 | -0.3722 | 34.6636 | -0.3768 | 27.8537 |

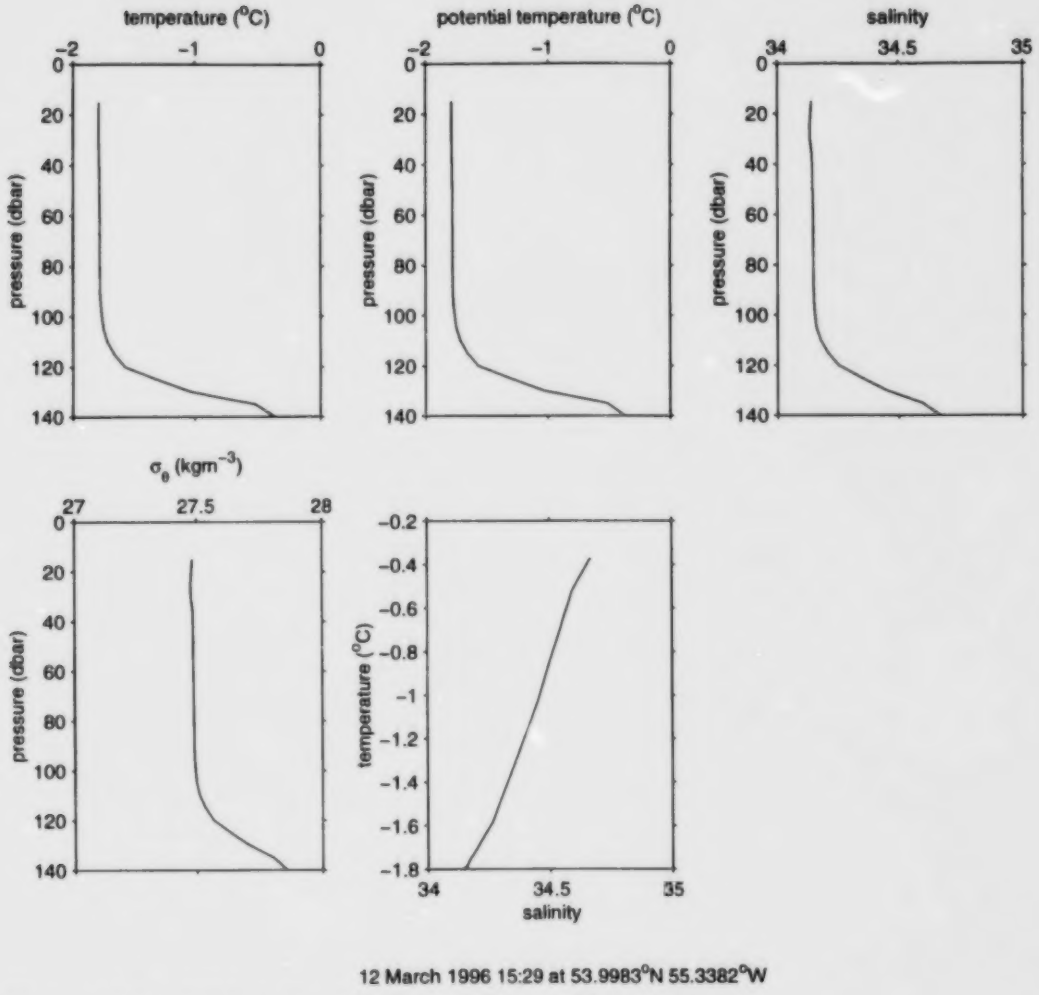


**Figure 12.5.3 1996 station 3 CTD and T-S profiles, downcast**

### 12.5.4 1996 station 4

FILE SPECIFICATION = CTD_95914_4P_1_DN.ODF
CRUISE NUMBER = 95914
CRUISE NAME = HAMILTON BANK
CRUISE DESCRIPTION = LABRADOR RADAR SAT VAL
START DATE TIME = 19-MAR-1996 13:00:53.75
END DATE TIME = 19-MAR-1996 13:06:07.25
INITIAL LATITUDE = 53.9383
INITIAL LONGITUDE = -55.6162
END LATITUDE = 53.9383
END LONGITUDE = -55.6162
MIN DEPTH = 5.968
MAX DEPTH = 213.4114
SAMPLING INTERVAL = 0.00000000
SOUNDING = 200.0
EVENT COMMENTS = 28-MAR-1996 14:09:24 CAST 04
EVENT COMMENTS = 28-MAR-1996 14:50:02 PRESSURE OFFSET OF 1.284 ADDED

**Table 12.5.4 1996 CTD station 4, downcast data**

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 10 | -1.7600 | | -1.7601 | |
| 15 | -1.7613 | | -1.7615 | |
| 20 | -1.7615 | | -1.7617 | |
| 25 | -1.7618 | | -1.7622 | |
| 30 | -1.7618 | | -1.7622 | |
| 35 | -1.7622 | | -1.7627 | |
| 40 | -1.7622 | 32.8277 | -1.7628 | 26.4139 |
| 45 | -1.7621 | 32.8273 | -1.7629 | 26.4135 |
| 50 | -1.7624 | 32.8273 | -1.7632 | 26.4136 |
| 55 | -1.7625 | 32.8267 | -1.7634 | 26.4131 |
| 60 | -1.7623 | 32.8270 | -1.7633 | 26.4133 |
| 65 | -1.7625 | 32.8271 | -1.7636 | 26.4134 |
| 70 | -1.7634 | 32.8274 | -1.7645 | 26.4136 |
| 75 | -1.7650 | 32.8279 | -1.7662 | 26.4141 |
| 80 | -1.7656 | 32.8285 | -1.7669 | 26.4146 |
| 85 | -1.7664 | 32.8287 | -1.7678 | 26.4148 |
| 90 | -1.7675 | 32.8290 | -1.7690 | 26.4151 |
| 95 | -1.7685 | 32.8293 | -1.7701 | 26.4154 |
| 100 | -1.7720 | 32.8299 | -1.7736 | 26.4159 |
| 105 | -1.7726 | 32.8300 | -1.7744 | 26.4160 |
| 110 | -1.7726 | 32.8303 | -1.7745 | 26.4163 |
| 115 | -1.7718 | 32.8315 | -1.7737 | 26.4172 |
| 120 | -1.7665 | 32.8344 | -1.7685 | 26.4195 |
| 125 | -1.7508 | 32.8394 | -1.7530 | 26.4232 |
| 130 | -1.6923 | 32.8530 | -1.6946 | 26.4329 |
| 135 | -1.6578 | 32.8602 | -1.6602 | 26.4380 |
| 140 | -1.5430 | 32.8841 | -1.5458 | 26.4545 |
| 145 | -1.5328 | 32.8977 | -1.5357 | 26.4653 |
| 150 | -1.5118 | 32.9038 | -1.5148 | 26.4698 |
| 155 | -1.4608 | 32.9161 | -1.4640 | 26.4784 |
| 160 | -1.4352 | 32.9372 | -1.4385 | 26.4949 |

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 165 | -1.4224 | 32.9474 | -1.4258 | 26.5027 |
| 170 | -1.3943 | 32.9570 | -1.3979 | 26.5097 |
| 175 | -1.3657 | 32.9649 | -1.3695 | 26.5154 |
| 180 | -1.3251 | 32.9773 | -1.3291 | 26.5243 |
| 185 | -1.2852 | 32.9893 | -1.2894 | 26.5329 |
| 190 | -1.2662 | 32.9955 | -1.2705 | 26.5373 |
| 195 | -1.2430 | 33.0114 | -1.2475 | 26.5496 |
| 200 | -1.1702 | 33.0287 | -1.1749 | 26.5614 |
| 205 | -1.1312 | 33.0465 | -1.1361 | 26.5746 |
| 210 | -1.1080 | 33.0532 | -1.1131 | 26.5793 |

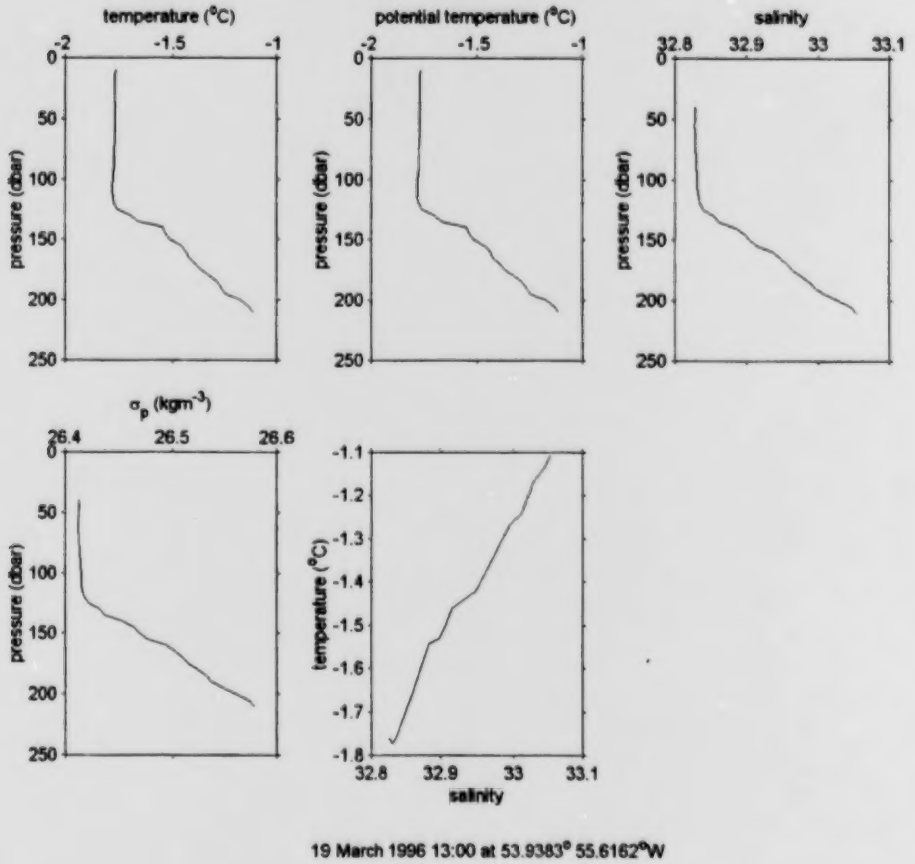


**Figure 12.5.4 1996 station 4 CTD and T-S profiles, downcast**

### 12.5.5 1996 station 5

FILE SPECIFICATION = CTD_95914_5P_1_UP.ODF
CRUISE NUMBER = 95914
CRUISE NAME = HAMILTON BANK
CRUISE DESCRIPTION = LABRADOR RADAR SAT VAL
START DATE TIME = 19-MAR-1996 13:44:29.75
END DATE TIME = 19-MAR-1996 13:51:08.75
INITIAL LATITUDE = 53.8838
INITIAL LONGITUDE = -55.8885
END LATITUDE = 53.8838
END LONGITUDE = -55.8885
MIN DEPTH = 0.6
MAX DEPTH = 141.6
SAMPLING INTERVAL = 0.00000000
SOUNDING = 150.0
EVENT COMMENTS = 29-MAR-1996 07:55:02 CAST 05
EVENT COMMENTS = 29-MAR-1996 08:18:46 PRESSURE OFFSET OF 1.284 ADDED
EVENT COMMENTS = '29-MAR-1996 09:33:57 BAD DOWN TRACE SO UP WAS USED
EVENT COMMENTS = '29-MAR-1996 09:33:57 THICK SMALL FLOE - DONE OVER EDGE
EVENT COMMENTS = '29-MAR-1996 09:33:57 COULD NOT DRILL HOLE THROUGH ICE

**Table 12.5.5 1996 CTD station 5, upcast data**

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 5 | -1.7482 | 32.7685 | -1.7483 | 26.3655 |
| 10 | -1.7476 | 32.7701 | -1.7477 | 26.3668 |
| 15 | -1.7482 | 32.7719 | -1.7484 | 26.3682 |
| 20 | -1.7499 | 32.7764 | -1.7502 | 26.3719 |
| 25 | -1.7507 | 32.7845 | -1.7511 | 26.3785 |
| 30 | -1.7511 | 32.7952 | -1.7515 | 26.3872 |
| 35 | -1.7522 | 32.8008 | -1.7527 | 26.3918 |
| 40 | -1.7544 | 32.8049 | -1.755 | 26.3952 |
| 45 | -1.7597 | 32.8134 | -1.7604 | 26.4022 |
| 50 | -1.7643 | 32.8227 | -1.7651 | 26.4098 |
| 55 | -1.7641 | 32.8241 | -1.765 | 26.4111 |
| 60 | -1.7638 | 32.8248 | -1.7648 | 26.4116 |
| 65 | -1.7633 | 32.8252 | -1.7643 | 26.4119 |
| 70 | -1.7631 | 32.8256 | -1.7643 | 26.4122 |
| 75 | -1.7628 | 32.8261 | -1.764 | 26.4126 |
| 80 | -1.7623 | 32.8269 | -1.7637 | 26.4133 |
| 85 | -1.7614 | 32.8274 | -1.7628 | 26.4137 |
| 90 | -1.7606 | 32.828 | -1.7621 | 26.4142 |
| 95 | -1.7594 | 32.8291 | -1.761 | 26.415 |
| 100 | -1.7581 | 32.8298 | -1.7598 | 26.4156 |
| 105 | -1.754 | 32.8335 | -1.7557 | 26.4185 |
| 110 | -1.7428 | 32.8358 | -1.7447 | 26.42 |
| 115 | -1.7354 | 32.8375 | -1.7374 | 26.4213 |
| 120 | -1.7265 | 32.8372 | -1.7286 | 26.4209 |
| 125 | -1.7244 | 32.8368 | -1.7266 | 26.4204 |
| 130 | -1.7244 | 32.8368 | -1.7267 | 26.4204 |
| 135 | -1.7243 | 32.8369 | -1.7267 | 26.4206 |
| 140 | -1.724 | 32.8372 | -1.7265 | 26.4208 |

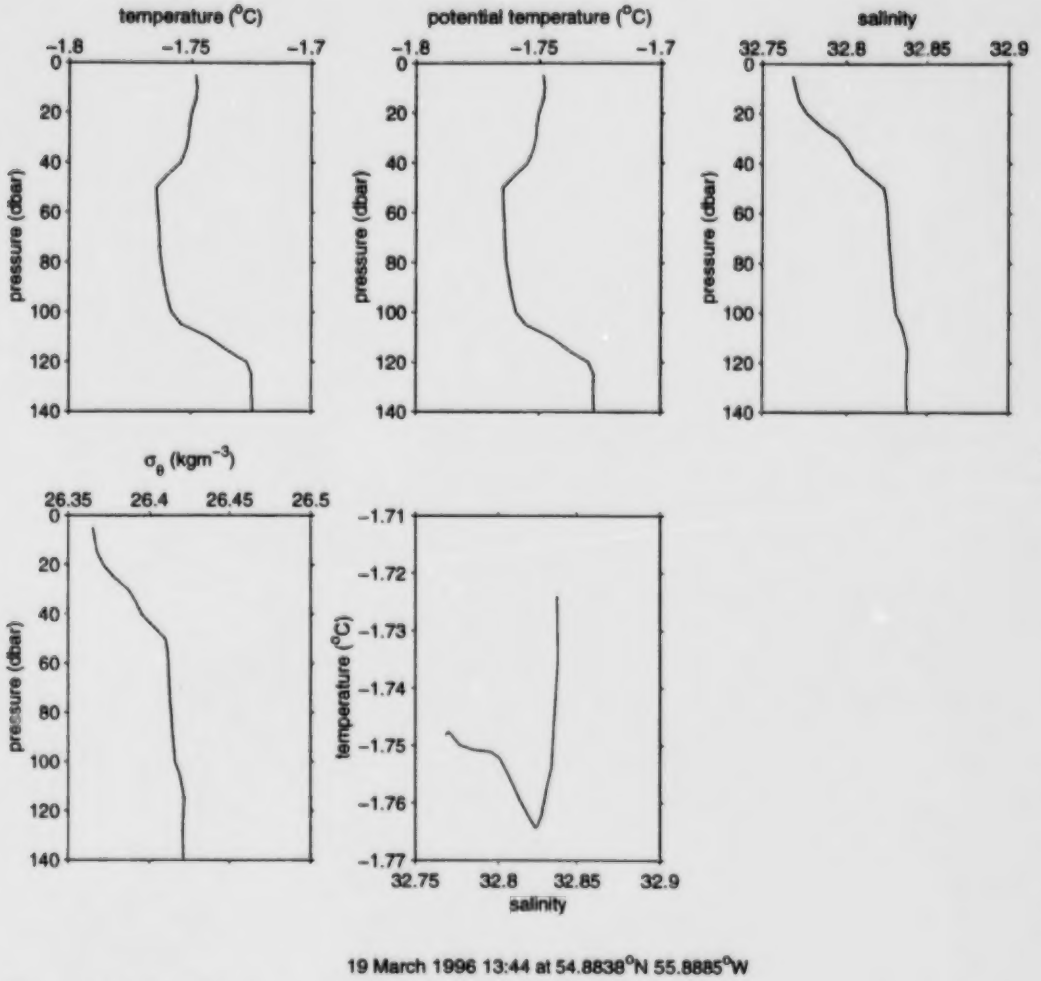


**Figure 12.5.5 1996 station 5 CTD and T-S profiles, upcast**

### 12.5.6 1996 station 6

FILE SPECIFICATION = CTD_95914_6P_1_DN.ODF
CRUISE NUMBER = 95914
CRUISE NAME = HAMILTON BANK
CRUISE DESCRIPTION = LABRADOR RADAR SAT VAL
START DATE TIME = 19-MAR-1996 14:15:02.25
END DATE TIME = 19-MAR-1996 14:17:04.75
INITIAL LATITUDE = 53.8407
INITIAL LONGITUDE = -56.1378
END LATITUDE = 53.8407
END LONGITUDE = -56.1378
MIN DEPTH = 2.8
MAX DEPTH = 86.4
SAMPLING INTERVAL = 0.00000000
SOUNDING = 92.0
EVENT COMMENTS = 29-MAR-1996 08:30:24 CAST 06
EVENT COMMENTS = 29-MAR-1996 09:01:08 PRESSURE OFFSET OF 1.189 ADDED
EVENT COMMENTS = 29-MAR-1996 09:35:46 SMALL FLOE - THIN ICE

**Table 12.5.6 1996 CTD station 6, downcast data**

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 5 | -1.7265 | 32.422 | -1.7265 | 26.0834 |
| 10 | -1.7355 | 32.4339 | -1.7356 | 26.0933 |
| 15 | -1.7409 | 32.4448 | -1.7411 | 26.1022 |
| 20 | -1.7453 | 32.4595 | -1.7455 | 26.1142 |
| 25 | -1.7463 | 32.4736 | -1.7466 | 26.1257 |
| 30 | -1.7447 | 32.4848 | -1.7451 | 26.1347 |
| 35 | -1.7525 | 32.5577 | -1.753 | 26.1942 |
| 40 | -1.7711 | 32.673 | -1.7717 | 26.2883 |
| 45 | -1.7748 | 32.6975 | -1.7755 | 26.3083 |
| 50 | -1.7764 | 32.7138 | -1.7772 | 26.3216 |
| 55 | -1.7771 | 32.7346 | -1.7779 | 26.3385 |
| 60 | -1.7759 | 32.7508 | -1.7769 | 26.3517 |
| 65 | -1.7736 | 32.785 | -1.7746 | 26.3795 |
| 70 | -1.7724 | 32.7961 | -1.7736 | 26.3884 |
| 75 | -1.772 | 32.7997 | -1.7732 | 26.3913 |
| 80 | -1.7718 | 32.8004 | -1.7731 | 26.3919 |
| 85 | -1.7716 | 32.801 | -1.773 | 26.3924 |

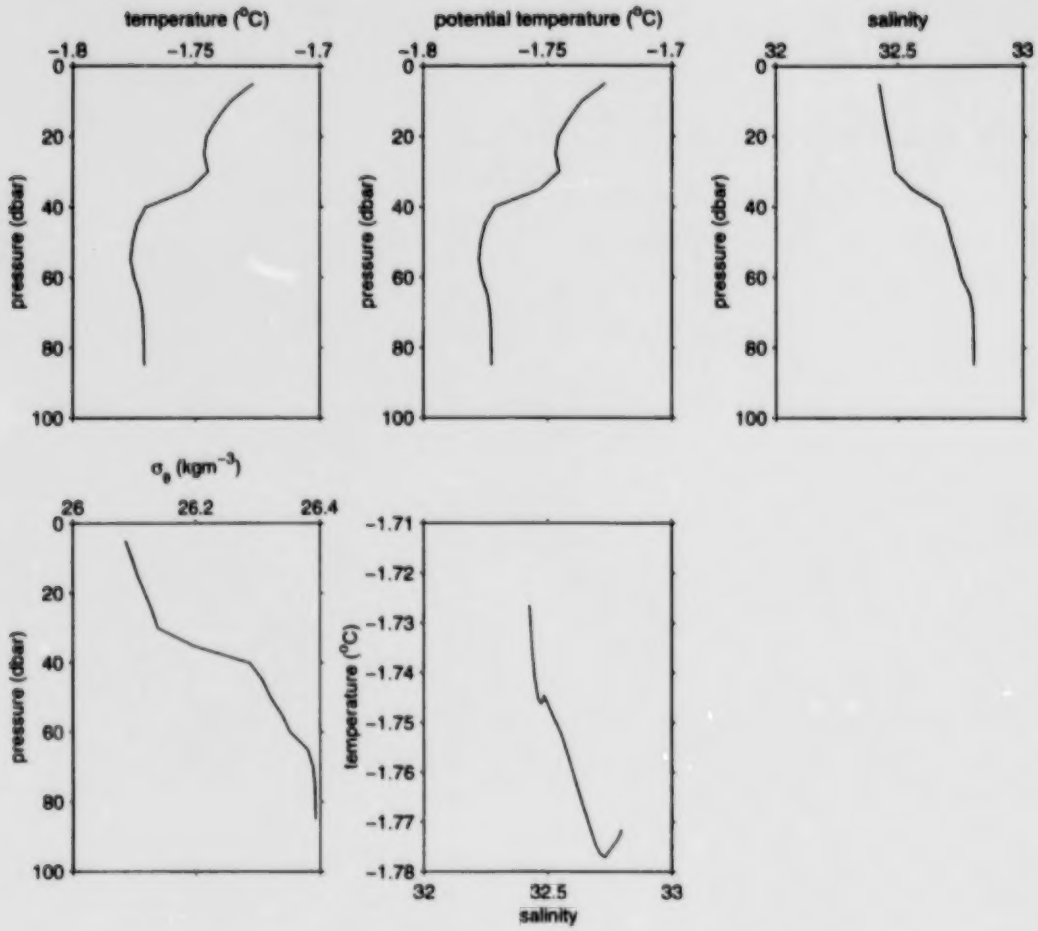


**Figure 12.5.6 1996 station 6 CTD and T-S profiles, downcast**

# 13. APPENDIX F: 1997 DATA AND PLOTS

## 13.1 1997 Miscellaneous data

**Table 13.1.1 Gulf of St. Lawrence 1997 station data**

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **Gulf 1**<br>Feb. 24<br>(day 55) | • 8 km/h W<br>• clear, -10°C | • 34 cm of ice<br>• large, 1.5 km x 1.5 km<br>• 17 cm of snow flooded to 5 cm depth | • beacon 26374 deployed at 16:00 GMT<br>• 68 m of water | • slush layer 15 psu |
| **Gulf 2**<br>Feb 24<br>(day 55) | • 8 km/h W<br>• clear, -10°C | • 30 cm of ice<br>• large, 2 km x 2 km<br>• 17 cm of snow flooded to 4 cm depth | • beacon 26379 deployed at 18:15 GMT<br>• 121 m of water | • slush layer 15 psu<br>• snow 2 psu |
| **Gulf 3**<br>Feb. 24<br>(day 55) | • 8 km/h W<br>• clear, -10°C | • 32 cm of ice<br>• large, 2 km x 2 km<br>• 11-20 cm of snow flooded/frozen to 1 cm depth | • beacon 26370 deployed at 19:20 GMT<br>• 57 m of water | • surface ice 13 psu<br>• frozen slush layer 14 psu<br>• snow 2 psu |
| **Gulf 4**<br>Mar. 18<br>(day 77) | • 15 km/h NW<br>• clear, -6°C | • medium, 500 m x 500 m<br>• 38/40 cm thick | • station 18-1<br>• deployed GPS beacon 26386 15:05 GMT<br>• SW edge of heavier pack-ice | |
| **Gulf 5**<br>Mar. 18<br>(day 77) | • 15/km/h NW<br>• clear/cloudy<br>• -6°C | • large, 2 km x 2 km<br>• 40/44 cm thick | • station 18-2<br>• N edge of heavier pack-ice | |

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **20-1**<br>Feb. 20<br>(day 51) | • 15 km/h NW<br>• -8°C, clearing | | • beacon 26379 deployed at 21:45 GMT | |

**Ice/snow salinity profile at Station 20-1**

| # bags | Depth (cm) | Salinity (psu) |
|---|---|---|
| 15 | snow (8 cm) | 2.0 |
| 16 | slush (2 cm) | 16.0 |
| 24 | 5 | 3.0 |
| 18 | 10 | 7.0 |
| 21 | 15 | 6.0 |
| 22 | 20 | 8.0 |
| 17 | 30 | 10.0 |

| | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| Feb. 21<br>(day 52) | | | • beacon 972 deployed at 14:00 GMT<br>• removed beacon 26379 | |
| Feb. 23<br>(day 54) | | • 43 cm of ice<br>• 18 cm of hard snow flooded with 5 cm of water | • 7.1 m of water | |
| Feb. 24<br>(day 55) | | | | • hard snow 1 psu<br>• slush 6 psu<br>• bottom slush 14 psu<br>• slush water 56 psu<br>• surface water 32 psu |

| | | | | |
|---|---|---|---|---|
| **21-2**<br>Feb 21<br>(day 52) | • 15 km/h SW<br>• overcast/snow<br>• -2°C | | • beacon 968 deployed 14:10 GMT | |

| | | | | |
|---|---|---|---|---|
| **23-1**<br>Feb. 23<br>(day 54) | • 10 km/h W<br>• clear, -8°C | | • landfast ice Cape Gage<br>• placed 2 marker bags<br>• 11.7 m of water | |

| | | | | |
|---|---|---|---|---|
| **25-1**<br>Feb. 25<br>(day 56)<br><br><br><br><br><br>Feb. 26<br>(day 57) | • 10 km/h W<br>• clear, -15°C | • 600 m x 400 m<br>• 4 cm of new slush snow on top of old flooded snow/ice layer<br>• 67-68 cm of ice<br>• pan of old surface snow layer (15 cm) refrozen as ice | • pressure station<br>• GPS beacon 26380 at 18:15 GMT<br>• pressure beacon 1055 at 18:20 GMT<br>• pressure beacon 22192 at 18:29 GMT<br><br>• remove 26380 (not working); replaced with 968; renamed station as 26-1 | • surface ice 14 psu<br>• bottom of slush 60 psu<br>• surface slush 48 psu |

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **25-2**<br>Feb. 25<br>(day 56) | • 10 km/h W<br>• clear, -15°C | • large, 500 m x 500 m<br>• 1 cm of new snow on top of old flooded snow/ice layer<br>• 51 cm of ice<br>• pan of old surface snow layer (15 cm) refrozen as ice | • W GPS station<br>• beacon 973 | |
| **25-3**<br>Feb. 25<br>(day 56) | • 10 km/h W<br>• clear, -15°C | • large, 500 m x 500 m<br>• 1 cm of new snow on top of old flooded snow/ice layer<br>• 47/43/62 cm of ice<br>• pan of old surface snow layer (15 cm) refrozen as ice | • N GPS station<br>• 2.6 km N of pressure station<br>• GPS beacon 970 | |
| **25-4**<br>Feb. 25<br>(day 56) | • 10 km/h W<br>• clear, -15°C | • large, 500 m x 500 m<br>• 15 cm of snow on top<br>• 43/38 cm of ice | • 2.7 km S of pressure station<br>• GPS beacon 971 | |
| **25-5**<br>Feb. 25<br>(day 56) | • 10 km/h W<br>• clear, -15°C | • large, 500 m x 500 m<br>• 4 cm of new snow on top of old flooded snow/ice layer<br>• 57/58 cm of ice<br>• pan of old surface snow layer (15 cm) refrozen as ice | • 2.1 km E of pressure station<br>• GPS beacon 26375 at 19:20 GMT | |
| **25-6**<br>Feb. 25<br>(day 56) | • 10 km/h W<br>• clear, -15°C | • 35 cm new slush/snow<br>• 50-105 cm of ice | • weather station<br>• landfast ice<br>• atmospheric beacon 4770 at 19:50 GMT | |
| **26-1**<br>Feb. 26<br>(day 57) | • 9 km/h SW<br>• cloudy, -16°C | • original floe (station 25-1) split in half<br>• 2-3 cm of new snow | • pressure station<br>• replaced beacon 26380 with 968 at 20:00 GMT<br>• beacons 20 m inshore of lead (10 m)<br>• lead edges not changed, 15 m from pressure beacons which are still parallel to shore<br>• beacons frozen solid in the ice | |

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **26-2**<br>Feb. 26<br>(day 57) | • 9 km/h SW<br>• cloudy, -16°C | • large, 400 m x 400 m<br>• 50 cm of ice<br>• 15 cm of snow | • E GPS station<br>• GPS beacon 972 at 20:10 GMT<br>• GPS beacon 26375 not relocated | |
| **28-1**<br>Feb. 28<br>(day 59) | • 5 km/h N<br>• clear, -8°C | • 58 m of ice<br>• 30 cm of snow<br>• snow flooded to 3 cm | • IOS acoustic station<br>• landfast station off Cape Gage (ARGOS 4998/ 16.48 v)<br>• GPS beacon 974 at 16:05 GMT<br>• 16.9 m and 16.6 m water depth<br>• 3 pairs of marker bags | |
| **11-1**<br>Mar. 11<br>(day 70) | • 5 km/h N<br>• cloudy, -5°C<br>• fog | • new snow accumulated to 0.5 m<br>• weight of snow flooded bottom half of snow | • acoustic/ARGOS station<br>• heard beacon in morning but could not reach it due to large shore lead and fog<br>• located acoustic/ARGOS beacon with range finder in afternoon<br>• inside box water had frozen wires and box into surface ice broke box open and removed beacon (14:30 GMT)<br>• removed GPS beacon which was only 2 m from floe edge | |
| | | | | |
| **11-2**<br>Mar. 11<br>(day 70) | | • middle of large floe (similar to size broken off the landfast ice)<br>• snow to top of beacon container | • second try to locate beacon after it was not found in the morning<br>• located beacon visually from ARGOS location (21:30 GMT)<br>• not located by range finder, ice/water in antenna | |

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **12-1**<br>Mar. 12<br>(day 71) | • 15 km/h N<br>• cloudy, -10°C<br>• thick fog | • ridge had formed 0.5 m from beacons<br>• dry ice to 40 cm<br>• 15 cm of dry new snow | • ice pressure beacons<br>• located beacons with range finder in thick fog<br>• removed both pressure beacons<br>• GPS beacon not found would be in the middle of the ridge | |

| **Beacon 1055** | | **4 m from ridge** | **Beacon 22192** | | **0.5 m from ridge** |
|---|---|---|---|---|---|
| **Bag #** | **Depth (cm)** | **Salinity (psu)** | **Bag #** | **Depth (cm)** | **Salinity (psu)** |
| 16 | 5 | 2 | 3 | 5 | 5 |
| 8 | 15 | 5 | 2 | 20 | 5 |
| 6 | 25 | 6 | 1 | 30 | 6 |
| 5 | 30 | 6 | 32 | 40 | 8 |
| 4 | 40 | 8 | | | |

| | | | | |
|---|---|---|---|---|
| **17-1**<br>Mar. 17<br>(day 76) | • 19 km/h SW<br>• clear, -5°C | • thick ice is inshore (fast ice) | • calibration lines<br>• Point Prim<br>• E end 3.8 m water depth<br>• W end 3.6 m water depth<br>• W end ends into a shoal, stranded ice | |
| Mar. 19<br>(day 78) | | • ice thickness: 34, 35, and 35.5 cm | • mean calibration line (35 cm area) | • water depth in 3 holes: 3.2, 3.4, and 3.2 m |
| Mar. 20<br>(day 79) | • 9 km/h SW<br>• clear, -9°C | • 35 cm of ice at both ends and middle | • probe profiled 15:30 GMT<br>• salinity samples at center of line | |

| **Bag #** | **Depth (cm)** | **Salinity (psu)** |
|---|---|---|
| 6 | 2 | 6 |
| 10 | 8 | 6 |
| 3 | 12 | 6 |
| 8 | 18 | 6 |
| 4 | 25 | 12 |
| | water | 30 |

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **17.1**<br>Mar. 23<br>(day 82) | • 15 km/h NW<br>• clear, -8°C | | • changed line length to 160 m<br>• put in cross line of 160 m at centre bag | |

| Bag # | Distance (m) | Ice (m) | Depth (m) | Snow Drifts (cm) |
|---|---|---|---|---|
| | -400 | major ridge | | |
| | -325 | first ridge | 72/68/200/220/230 | |
| | -300 | minor ridge to N of line | | |
| | -110 | 38 | 5.2 | 18/16/12 |
| L | -65 | 36 | 4.8 | 18/16/12 |
| | -40 | 37 | 4.6 | 18/14/12 |
| 1 | 0 | 36 | 4.4 | 18/16 |
| 2 | 20 | 36 | 4.1 | 14/15/16 |
| 3 | 40 | 36 | 3.8 | 14/14/15 |
| 4 | 60 | 38 | 3.6 | 15/18/16 |
| 5 | 80 | 35 | 3.4 | 10/12/12 |
| 6 | 100 | 35 | 3.4 | 08/10/08 |
| 7 | 120 | 33 | 3.6 | 10/12/14 |
| 8 | 140 | 38 | 3.6 | 12/08/18 |
| 9 | 160 | 37 | 3.5 | 12/12/14 |
| | 30 | 37 | 3.9 | 20/20/18 |
| | 63 | 38 | 3.8 | 12/14/18 |
| FR | 80/110 | 64/60/55 | 4.1/4.2/3.8 | 00/00/00 |
| | 120 | 35 | 3.9 | 12/16/14 |

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **Strait 1**<br>Mar. 17<br>(day 76) | • 10 km/h SW<br>• clear, -5°C | • medium, 400 m x 400 m<br>• thicker than 1 m<br>• snow layer frozen | • station 17-2<br>• beacon 2363 21:15 GMT | |
| **19-1**<br>Mar. 19<br>(day 78) | • 18 km/h SW<br>• clear, -9°C | • largest flat pan 5 m x 5 m<br>• refrozen rubble no snow | • deployed beacon 26384 14:45 GMT<br>• 1 mile inside grey ice N/S pancake ice rubble field<br>• landed at 2 places | • 4 holes thicker than 2 m |
| Mar. 20<br>(day 79) | • 9 km/h SW<br>• clear, -9°C | • 40, 45, 40, and 46 cm of ice<br>• 2-3 m floes hard/straight edges | • 46°57.0'N, 62°38.9'W | |
| Mar. 20<br>(day 79) | • 9 km/h SW<br>• clear, -9°C | • 1.5+, 1.5+, and 1.5 m of ice<br>• 5-6 m floes (pans) | • 46°56.0'N, 62°32.5'W<br>• width of field:<br>• from 46°57.56'N, 62°40.0'W<br>• to 46°53.7'N, 62°35.1'W | |
| **19-2**<br>Mar. 19<br>(day 78) | • clear, -9°C | • ice thickness: 62/63 cm<br>• snow drifts 0-30 cm | • Ainslie Lake, Cape Breton<br>• fresh water lake | |

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **21-1**<br>Mar. 21<br>(day 80) | • 11 km/h SE<br>• overcast/snowing<br>• -4°C | • large floe in pack-ice<br>• 0 m = 86 cm<br>• 5 m = 92 cm<br>• 15 m = > 160 cm<br>• 25 m = 105 cm<br>• 35 m = 100 cm<br>• 45 m = 135 cm<br>• 55 m = 60 cm<br>• 65 m = 60 cm<br>• 75 m = 92 cm | • pack-ice<br>• N-S 75 m line out<br>• 75 m S of ridge | |
| **22-1**<br>Mar. 22<br>(day 81) | • 6 km/h NW<br>• clear, -11°C | • 60 cm of ice<br>• floe with ridge | • Tracadie Bay<br>• landfast ice along N shore of PEI<br>• 11 m of water | |
| **24-1**<br>Mar. 24<br>(day 83) | • 19 km/h W<br>• clear, –10°C | | • Tracadie Bay<br>• snow dune | |

| Distance (m) | Snow (cm) | Distance (m) | Snow (cm) | |
|---|---|---|---|---|
| 60 | 0 | -120 | 0 | ice |
| 55 | 0 | -100 | 15 | dune |
| 50 | 0 | -80 | 5 | ice |
| 45 | 0 | -70 | 8 | ice |
| 40 | 2 | -60 | 10 | ice |
| 35 | 2 | -50 | 5 | ice |
| 30 | 0 | -40 | 14 | dune |
| 25 | 2 | -30 | 15 | dune |
| 20 | 0 | -20 | 5 | dune |
| 15 | 0 | -10 | 5 | dune |
| 10 | 0 | 0 | 0 | ridge |
| 9 | 10 | | | |
| 8 | 10 | | | |
| 7 | 15 | | | |
| 6 | 20 | | | |
| 5 | 20 | | | |
| 4 | 25 | | | |
| 3 | 20 | | | |
| 2 | 15 | | | |
| 1 | 13 | | | |
| 0 | ridge | | | |

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **25-1**<br>Mar. 25<br>(day84) | • 15 km/h W<br>• clear, -8°C | • ridge separating 2 pans each 100+ m in size | • calibration line/ridge off Tracadie Bay<br>• 11 m of water<br>• NW-SE line with 1.5 m sail area<br>• ridge perpendicular to line<br>• distance positive to SE from centre of ridge | |

| Distance (m) | Ice (cm) | Snow (cm) | Distance (m) | Ice (cm) | Snow (cm) |
|---|---|---|---|---|---|
| 2.5 | | 20 | 2.5 | | 40 |
| 5 | 220+ | 10 | -5 | 190 | 20 |
| 10 | 230+ | 0 | -10 | 75 | 10 |
| 15 | 122 | 0 | -15 | 50 | 5 |
| 20 | 118 | 0 | -20 | 65 | 10 |
| 25 | 85 | 0 | -25 | 65 | 7 |
| 30 | 65 | 0 | -30 | 74 | 2 |
| 35 | 70 | 0 | -35 | 52 | 1 |
| 40 | 50 | 0 | -40 | 75 | 2 |
| 45 | 40 | 0 | -45 | 45 | 5 |
| 50 | 91 | 0 | -50 | 65 | 10 |
| 55 | 205 | 0 | -55 | 55 | 10 |
| 60 | 50 | 0 | -60 | 72 | 10 |
| 65 | 44 | 0 | -65 | 60 | 5 |
| 70 | 60 | 0 | -70 | 55 | 0 |
| 75 | 65 | 0 | -75 | 60 | 0 |
| | | | -80 | 55 | 0 |
| 80/110 | flat | 0 | -80/-125 | flat | 0 |
| | (65) | | | (55) | |
| 110 | 2 m ridge | | -125 | 2 m ridge | |

**Ice salinities at 20 m from centre ridge**

| Bag # | Depth (cm) | Salinity (psu) |
|---|---|---|
| 30 | 2 | 2 |
| 31 | 8 | 6 |
| 29 | 15 | 5 |
| 2 | 24 | 5 |
| 5 | 30 | 8 |
| 1 | 33 | 8 |
| 32 | 40 | 8 |

**Table 13.1.2 Labrador Shelf 1997 station data**

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **CTD 1** Mar. 3 (day 68) | | | • up cast only at 19:33 GMT | |
| **CTD 2** Mar. 4 (day 69) | | | • up cast only at 12:50 GMT | |
| **CTD 3** Mar. 4 (day 69) | | | • down and up casts at 14:16 GMT | |
| **CTD 4** Mar. 4 (day 69) | | | • down and up casts at 15:19 GMT | |
| **CTD 5** Mar. 4 (day 69) | | | • down and up casts at 18:13 GMT | |
| **CTD 6** Mar. 4 (day 69) | | | • down and up casts at 18:43 GMT | |
| **CTD 7** Mar. 4 (day 69) | | | • down and up casts at 18:47 GMT | |
| **5-1** Mar. 5 (day 70) | • 5 km/h NW<br>• clear, -20°C | • 25 m x 50 m<br>• 58/62/60/60 cm of ice trace snow | • pressure station<br>• centre location<br>• beacon 2362 13:25 GMT<br>• beacon 1053 13:35 GMT<br>• beacon 26373 13:20 GMT | |
| | | • 100 m x 100 m<br>• 30 cm of ice and trace of snow | • W GPS<br>• 2.31 km from centre<br>• beacon 10053 13:30 GMT | |
| | | • 25 m x 25 m<br>• 2.0 m of ice and a trace of snow | • E GPS<br>• 2.11 km from centre<br>• beacon 26371 14:00 GMT | |
| | | • 100 m x 100 m<br>• 1.5 m of ice and trace of snow | • N GPS<br>• 2.04 km from centre<br>• beacon 26372 14:10 GMT | |
| | | • 25 m x 75 m<br>• 2.0 m of ice and trace of snow | • S GPS<br>• 2.01 km from centre<br>• beacon 26369 13:30 GMT | |

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **5-2**<br>Mar. 5<br>(day 70) | • 5 km/h NW<br>• clear, -20°C | • 40 m x 60 m<br>• rafted on one side<br>• up to 2 m of ice<br>• 80/60/50/65 cm of ice and a trace of snow | • pressure station<br>• centre location<br>• beacon 2361 17:25 GMT<br>• beacon 976 17:20 GMT<br>• beacon 5217 17:15 GMT | |
| | | • 100 m x 100 m<br>• 60 cm of ice and 2 cm of snow | • W GPS<br>• 2.1 km from centre<br>• beacon 5216 17:35 GMT | |
| | | • 25 m x 50 m<br>• 80 cm of ice and 2 cm of snow | • E GPS<br>• 2.1 km from centre<br>• beacon 5215 17:40 GMT | |
| | | • 150 m x 100 m<br>• 1.0 m of ice and 2 cm of snow | • N GPS<br>• 2.1 km from centre<br>• beacon 5218 17:50 GMT | |
| | | • 75 x 75 m<br>• 80 cm of ice and 2 cm of snow | • S GPS<br>• 2.21 km from centre<br>• beacon 26367 18:00 GMT | |

## 13.1 1997 Pressure data

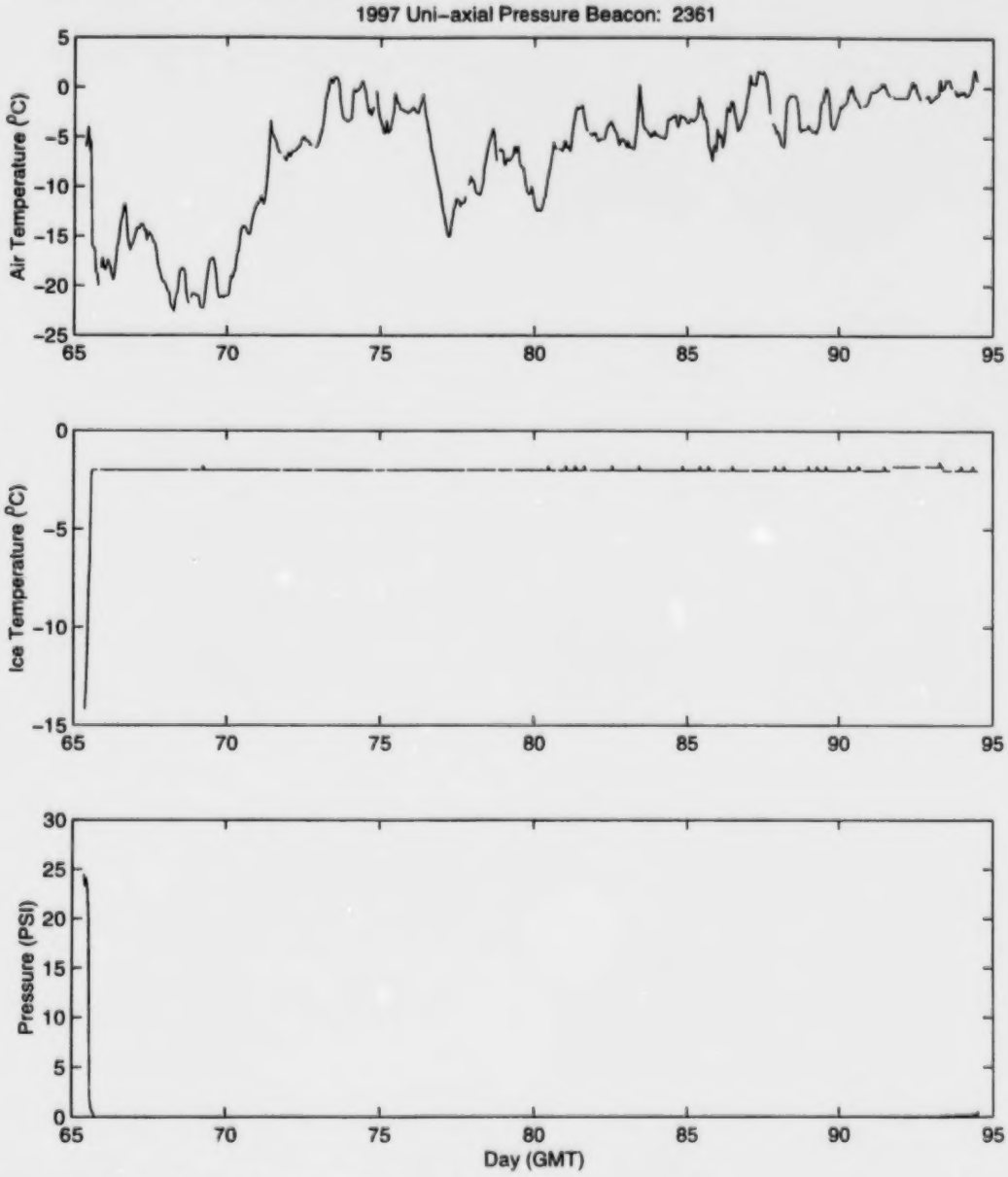


**Figure 13.2.1 1997 data from uni-axial pressure beacon 2361**

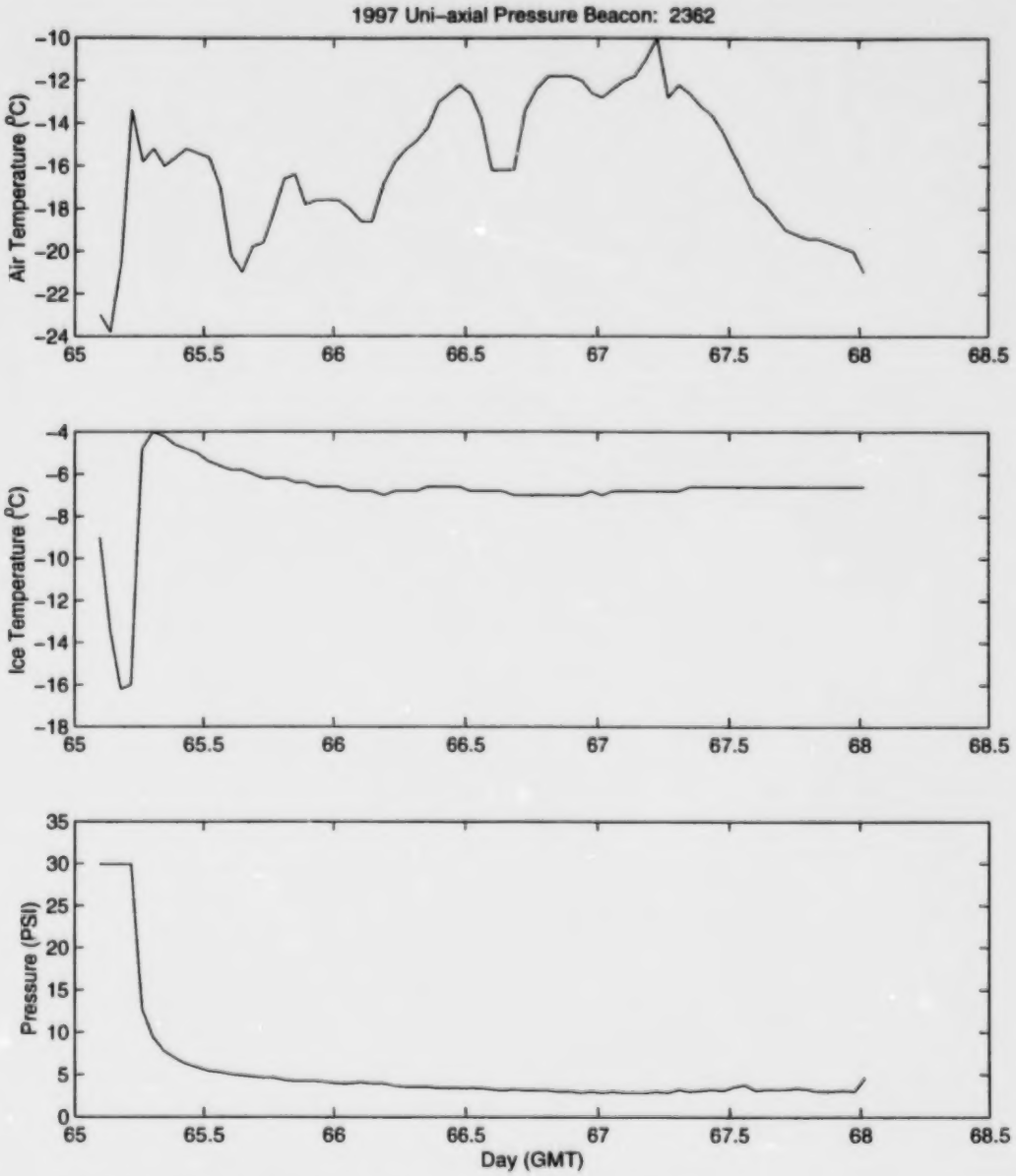


**Figure 13.2.2 1997 data from uni-axial pressure beacon 2362**

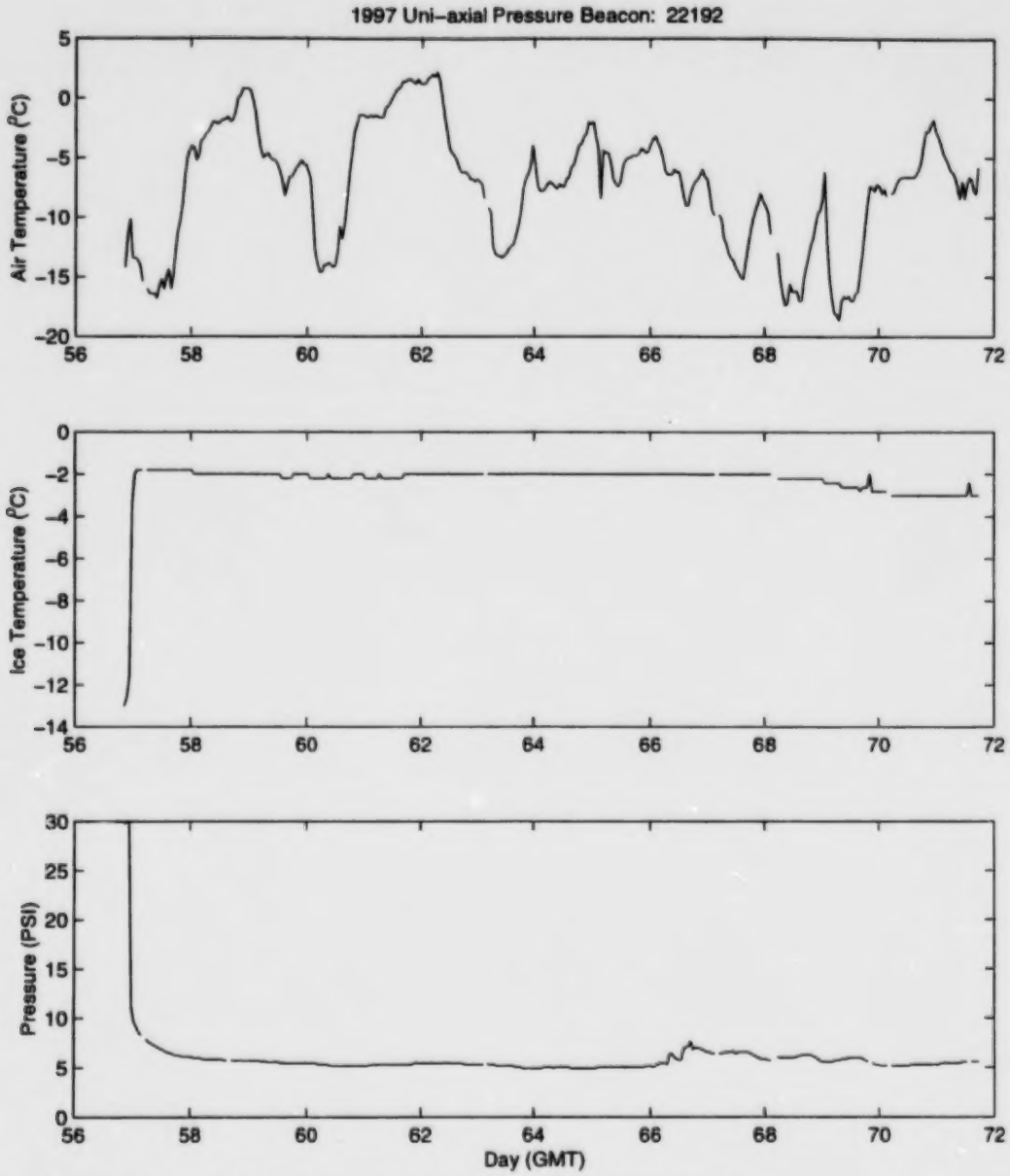


**Figure 13.2.3 1997 data from uni-axial pressure beacon 22192**

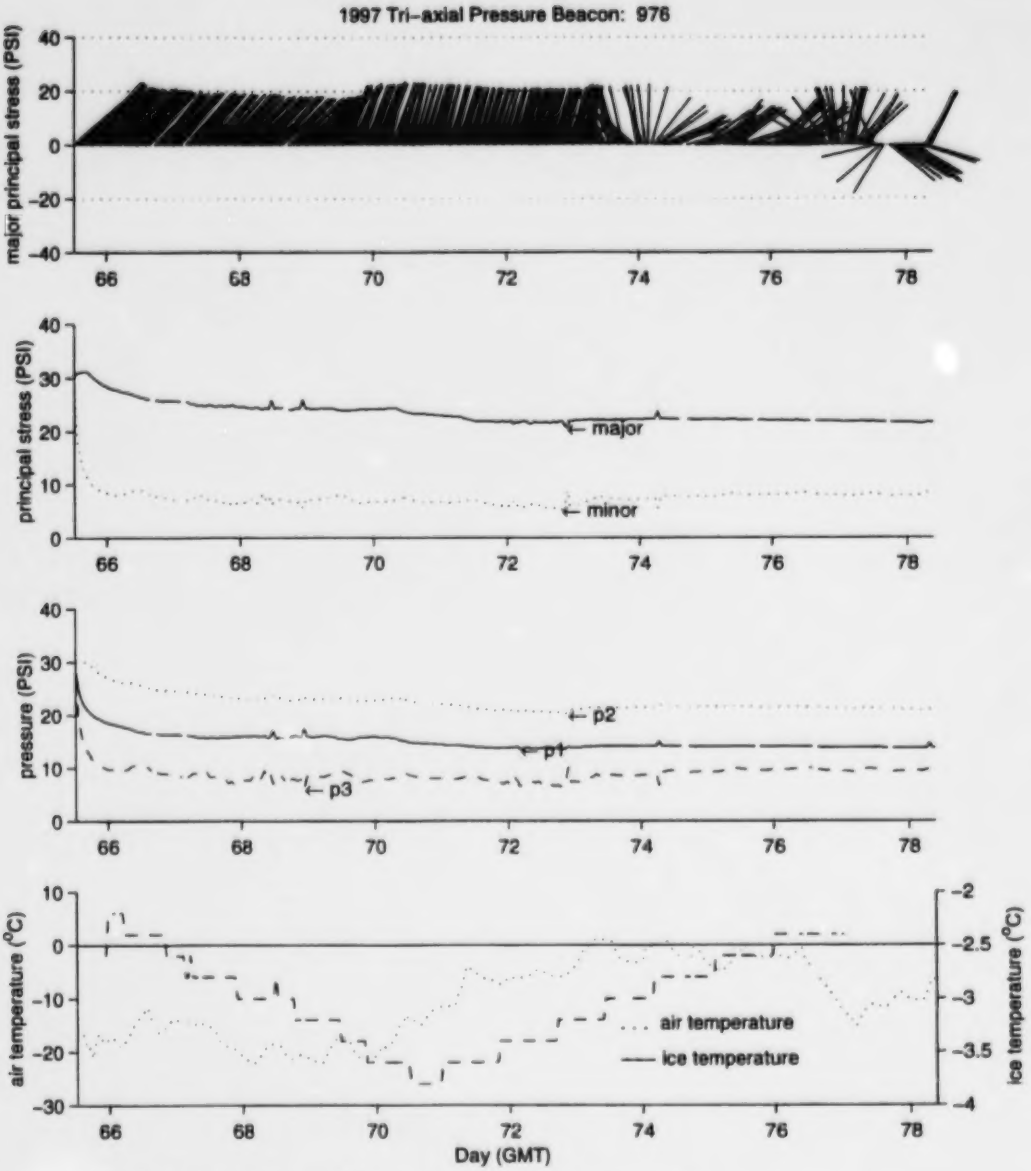


**Figure 13.2.4 1997 data from tri-axial pressure beacon 976**

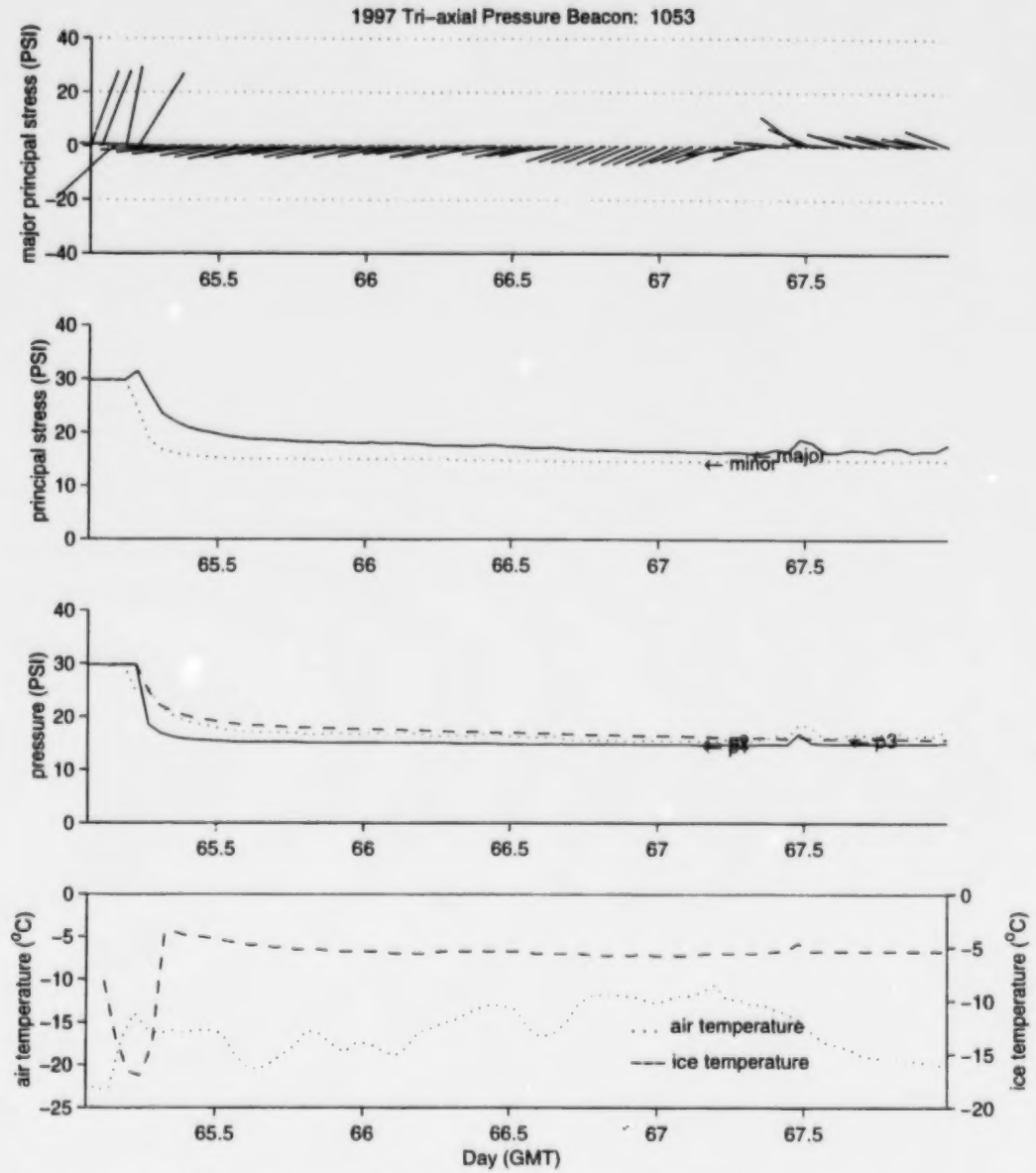


**Figure 13.2.5 1997 data from tri-axial pressure beacon 1053**

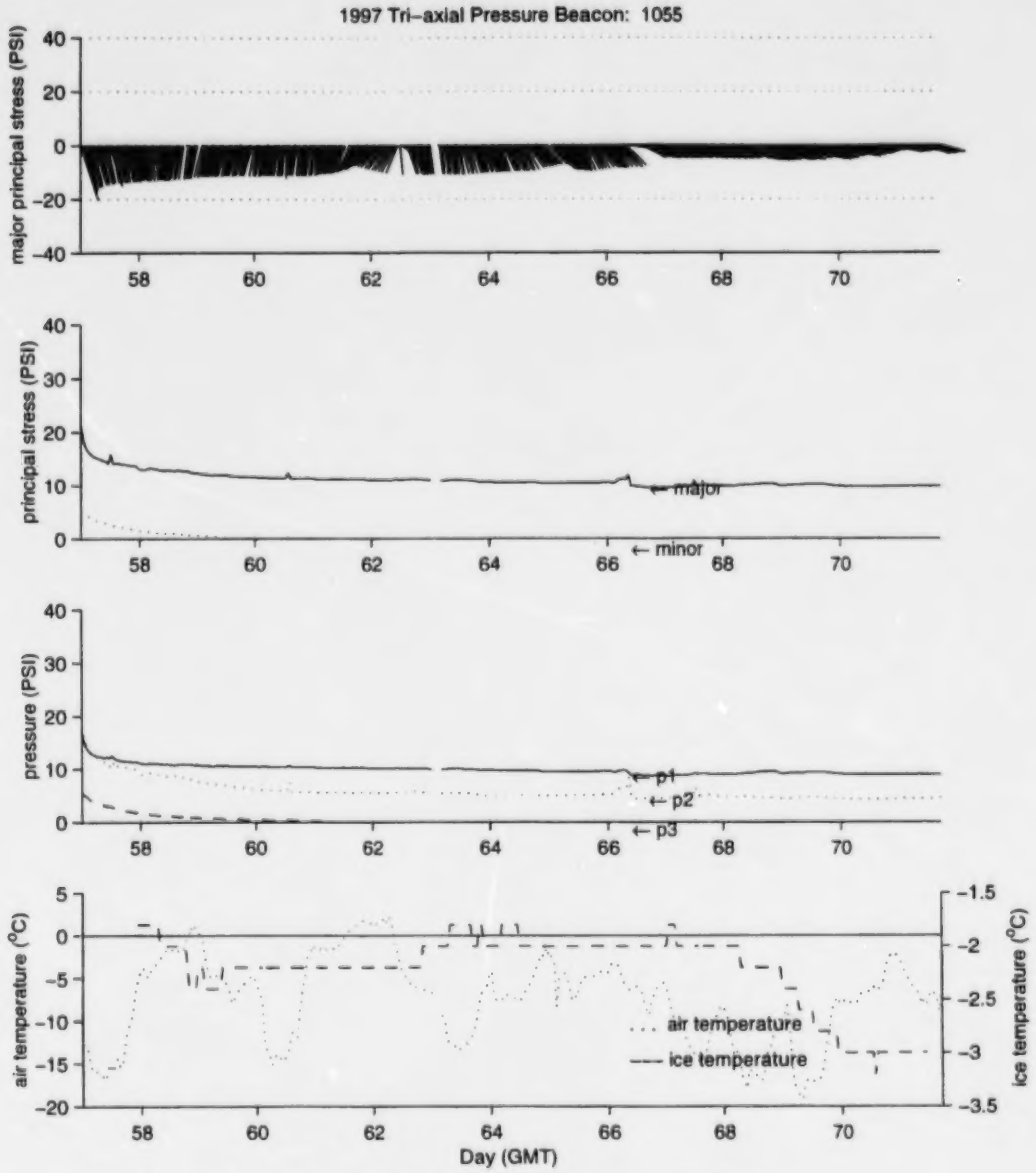


**Figure 13.2.6 1997 data from tri-axial pressure beacon 1055**

## 13.2 1997 GPS data

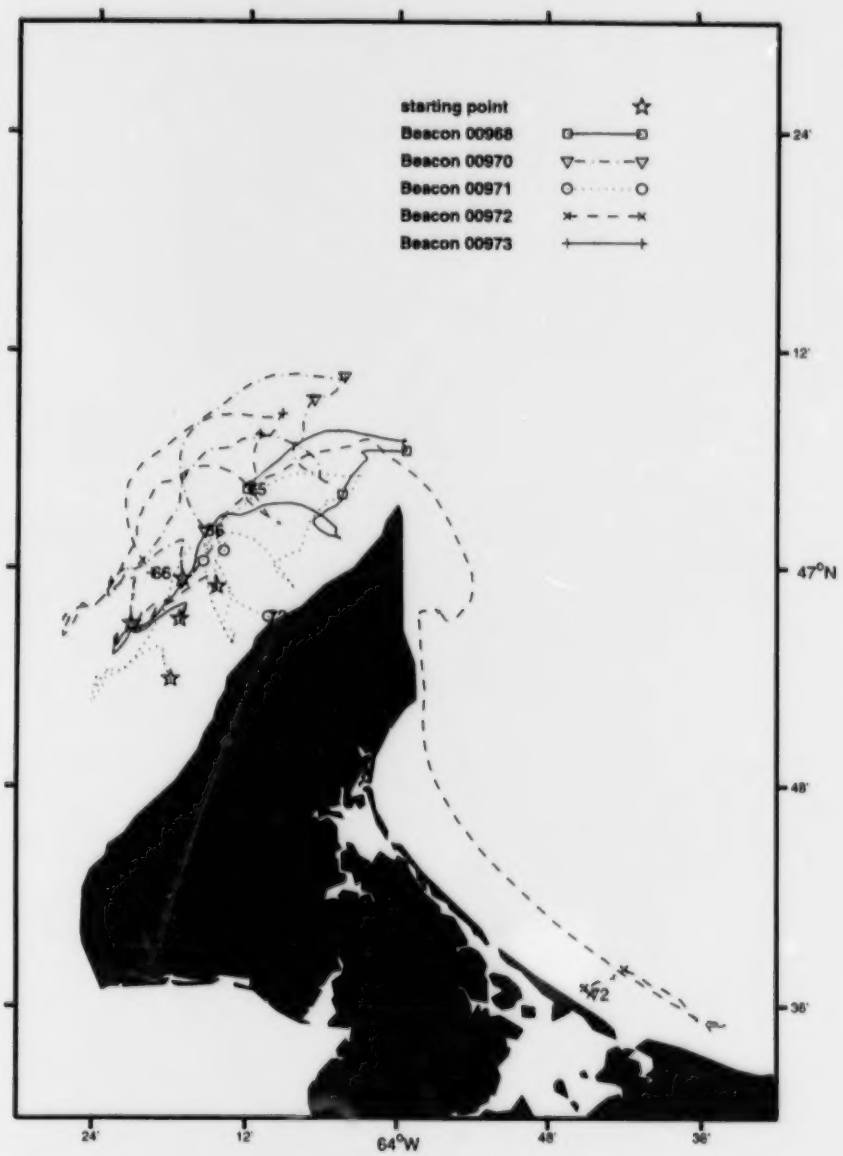


**Figure 13.3.1 1997 GPS beacon tracks for hourly data from beacons 968, 970, 971, 972, and 973 in the Gulf of St. Lawrence**

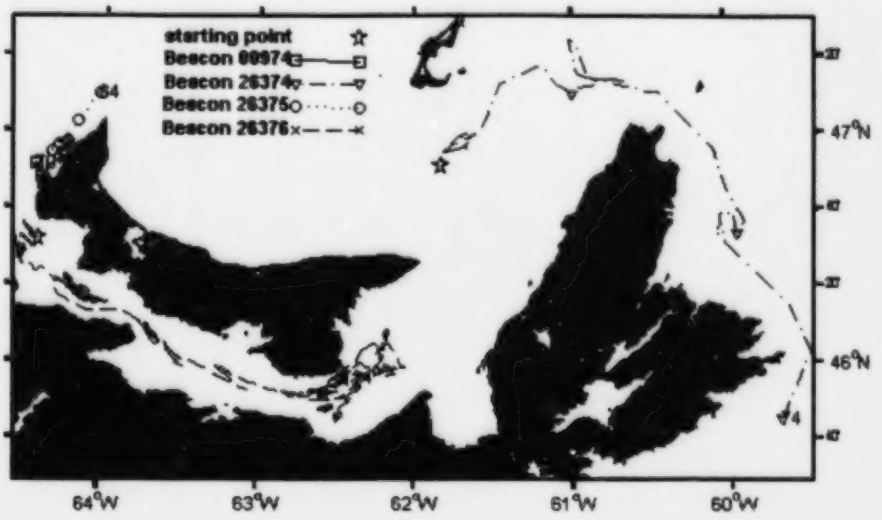


**Figure 13.3.2 1997 GPS beacon tracks for hourly data from beacons 974, 26374, 26375, and 26376 in the Gulf of St. Lawrence**

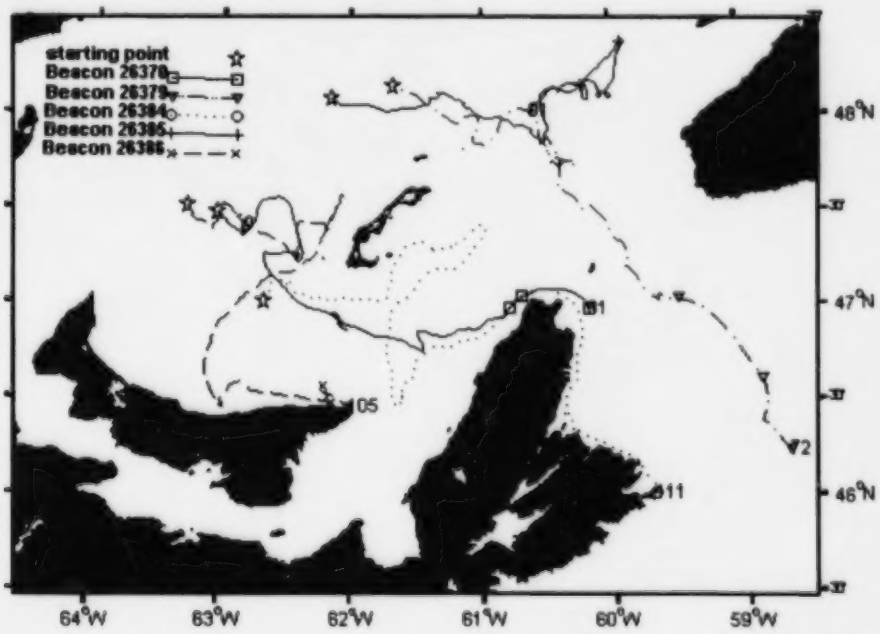


**Figure 13.3.3 1997 GPS beacon tracks for hourly data from beacons 26370, 26379, 26384, 26385, and 26386 in the Gulf of St. Lawrence**

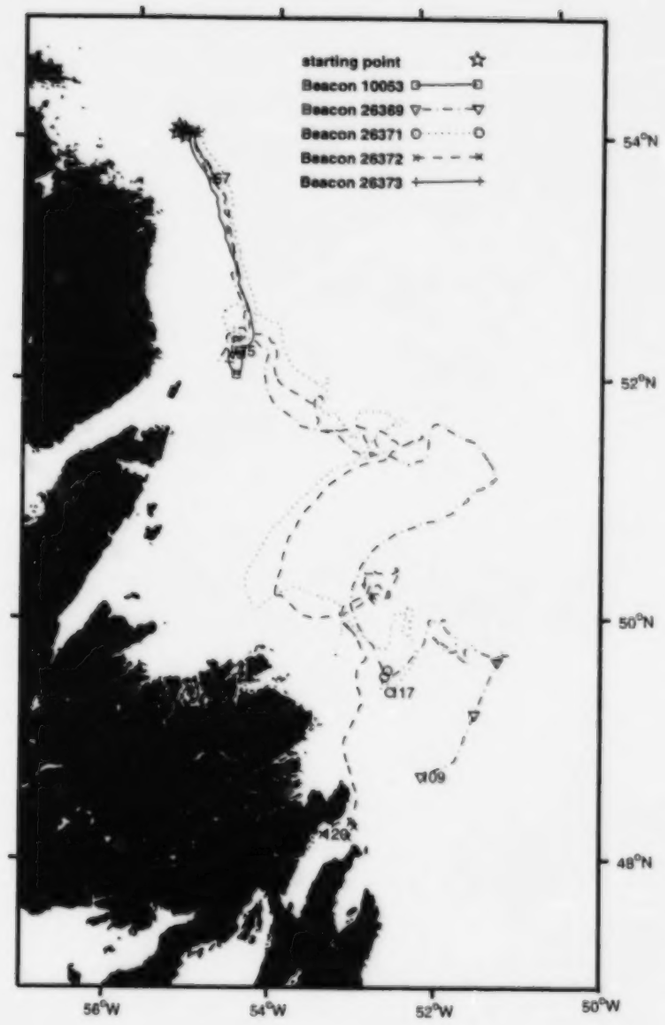


**Figure 13.3.4 1997 GPS beacon tracks for hourly data from beacons 10053, 26369, 26371, 26372, and 26373 off Labrador**



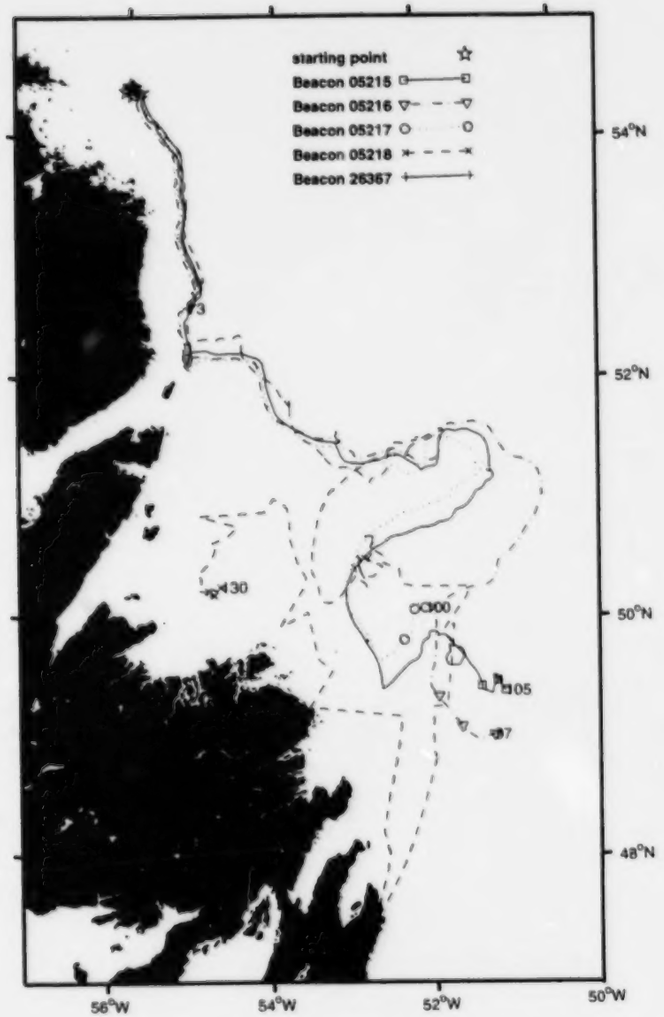


**Figure 13.3.5 1997 GPS beacon tracks for hourly data from beacons 5215, 5216, 5217, 5218, and 26367 off Labrador**

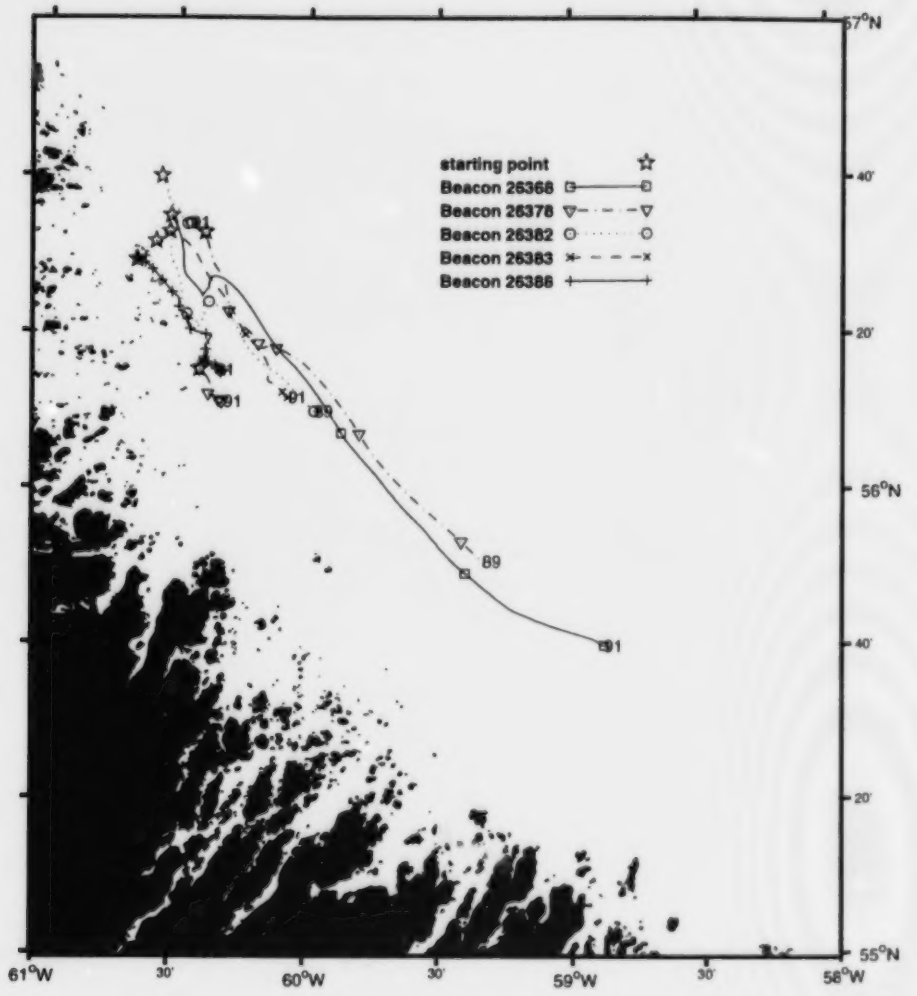


**Figure 13.3.6 1997 GPS beacon tracks for hourly data from beacons 26368, 26378, 26382, 26383, and 26388 off Labrador**

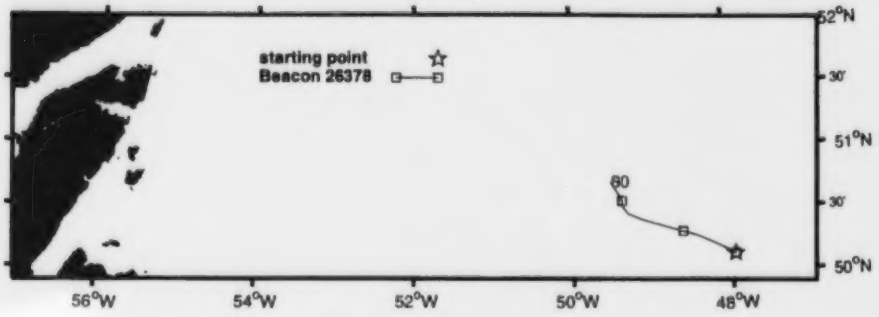


**Figure 13.3.7 1997 GPS beacon tracks for hourly data from beacon 26378 off Labrador**

## 13.3 1997 CTD data

### 13.4.1 1997 station 1

FILE SPECIFICATION = CTD_97906_1P_1_UP.ODF
CRUISE_NUMBER = 97906
CRUISE_NAME = HAMILTON BANK
CRUISE_DESCRIPTION = LABRADOR 1997
START_DATE_TIME = 3-MAR-1997 19:33:02.00
END DATE TIME = 3-MAR-1997 19:43:21.75
INITIAL LATITUDE = 54.1450
INITIAL LONGITUDE = -54.8695
END LATITUDE = 54.1450
END LONGITUDE = -54.8695
MIN DEPTH = 1.5
MAX DEPTH = 173.2
SOUNDING = 180.0
EVENT COMMENTS =28-MAY-1997 11:04:05 ICE THICKNESS 140 CM
EVENT COMMENTS =28-MAY-1997 11:04:05 TANG S ICE MELT BEACON INSTALLED
EVENT COMMENTS =28-MAY-1997 11:04:05 CAST 01
EVENT COMMENTS =29-MAY-1997 11:02:23 PRESSURE OFFSET OF 2.136 ADDED
EVENT COMMENTS = 3-JUN-1997 09:43:20 1_DN NOT KEPT SINCE THE DATA WAS NOT GOOD

**Table 13.4.1 1997 CTD station 1, upcast data**

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 5 | -1.7697 | 32.7909 | -1.7697 | 26.3841 |
| 10 | -1.7674 | 32.8225 | -1.7676 | 26.4098 |
| 15 | -1.7658 | 32.8229 | -1.7661 | 26.41 |
| 20 | -1.7653 | 32.8246 | -1.7656 | 26.4115 |
| 25 | -1.7644 | 32.8252 | -1.7647 | 26.4119 |
| 30 | -1.7633 | 32.8265 | -1.7638 | 26.4129 |
| 35 | -1.7624 | 32.8264 | -1.7629 | 26.4128 |
| 40 | -1.7642 | 32.8255 | -1.7648 | 26.4122 |
| 45 | -1.7643 | 32.8261 | -1.765 | 26.4127 |
| 50 | -1.7643 | 32.8256 | -1.7651 | 26.4122 |
| 55 | -1.7645 | 32.8257 | -1.7654 | 26.4122 |
| 60 | -1.7644 | 32.8258 | -1.7654 | 26.4124 |
| 65 | -1.7646 | 32.8257 | -1.7656 | 26.4124 |
| 70 | -1.7644 | 32.8257 | -1.7656 | 26.4123 |
| 75 | -1.7641 | 32.826 | -1.7653 | 26.4126 |
| 80 | -1.7637 | 32.8259 | -1.765 | 26.4125 |
| 85 | -1.7635 | 32.8259 | -1.7649 | 26.4125 |
| 90 | -1.7634 | 32.8259 | -1.7649 | 26.4125 |
| 95 | -1.7632 | 32.8259 | -1.7648 | 26.4124 |
| 100 | -1.7632 | 32.8261 | -1.7649 | 26.4126 |
| 105 | -1.7626 | 32.8265 | -1.7643 | 26.4129 |
| 110 | -1.7624 | 32.8267 | -1.7642 | 26.4131 |
| 115 | -1.7611 | 32.8292 | -1.763 | 26.4151 |
| 120 | -1.7457 | 32.8298 | -1.7477 | 26.4153 |
| 125 | -1.7527 | 32.8364 | -1.7549 | 26.4207 |
| 130 | -1.716 | 32.8461 | -1.7183 | 26.4278 |

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 135 | -1.704 | 32.8683 | -1.7064 | 26.4456 |
| 140 | -1.5626 | 32.9448 | -1.5653 | 26.5043 |
| 145 | -1.1688 | 33.0803 | -1.1722 | 26.603 |
| 150 | -0.528 | 33.1979 | -0.5323 | 26.6749 |
| 155 | -0.0553 | 33.151 | -0.0603 | 26.6165 |
| 160 | 0.0395 | 33.2141 | 0.0341 | 26.6629 |
| 165 | 0.3655 | 33.3858 | 0.3594 | 26.7845 |
| 170 | 0.548 | 33.3538 | 0.5415 | 26.7489 |

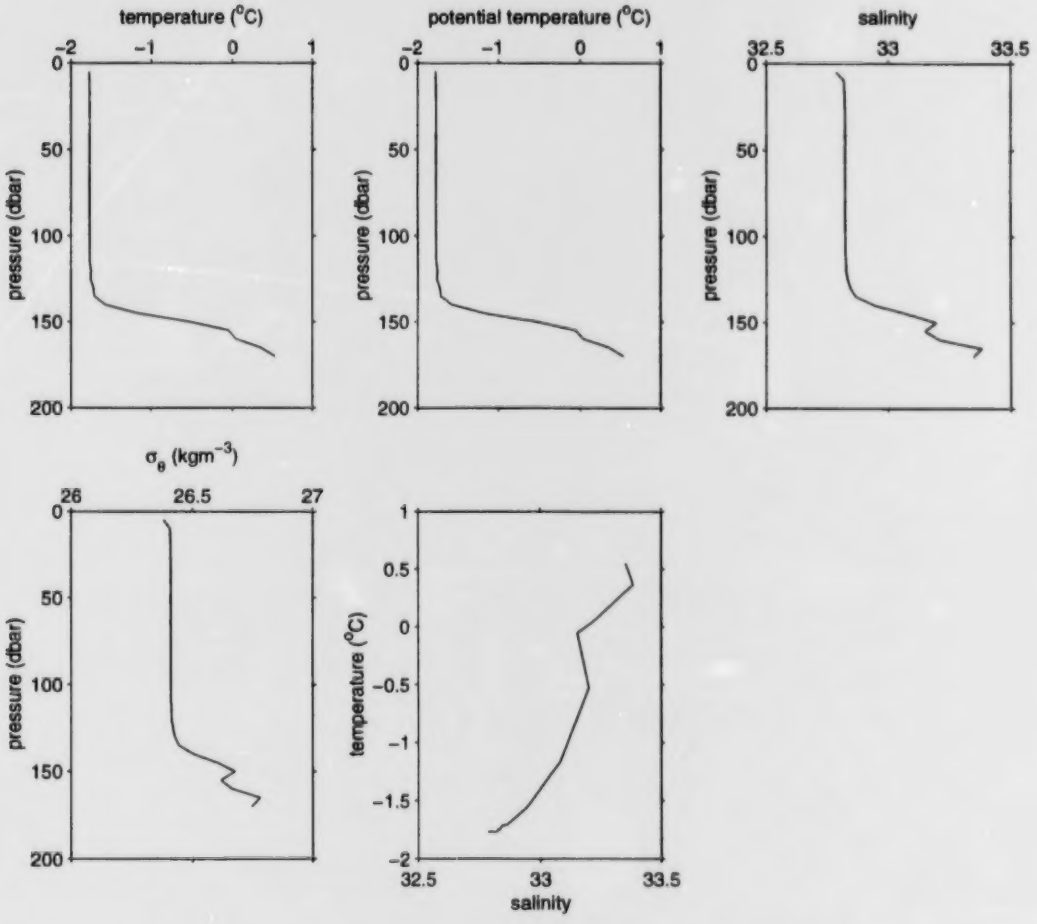


**Figure 13.4.1 1997 station 1 CTD and T-S profiles, upcast**

### 13.4.2 1997 station 2

FILE SPECIFICATION = CTD_97906_2P_2_UP.ODF
CRUISE_NUMBER = 97906
CRUISE_NAME = HAMILTON BANK
CRUISE_DESCRIPTION = LABRADOR 1997
START_DATE_TIME = 4-MAR-1997 12:50:17.50
END DATE TIME = 4-MAR-1997 12:56:59.75
INITIAL LATITUDE = 54.0811
INITIAL LONGITUDE = -55.0935
END LATITUDE = 54.0811
END LONGITUDE = -55.0935
MIN DEPTH = 0.6
MAX DEPTH = 158.2
SAMPLING INTERVAL = 0.25000000
SOUNDING = 160.0
EVENT COMMENTS = 28-MAY-1997 13:13:51 ICE THICKNESS 200 CM
EVENT COMMENTS = 28-MAY-1997 13:13:51 CAST 02
EVENT COMMENTS = 29-MAY-1997 13:07:17 PRESSURE OFFSET OF 1.189 ADDED
EVENT COMMENTS = 3-JUN-1997 09:43:46 1_DN NOT KEPT SINCE THE DATA WAS NOT GOOD

**Table 13.4.2 1997 CTD station 2, upcast data**

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 5 | -1.7893 | 32.8119 | -1.7893 | 26.4016 |
| 10 | -1.7882 | 32.8222 | -1.7883 | 26.41 |
| 15 | -1.7882 | 32.8299 | -1.7884 | 26.4162 |
| 20 | -1.7882 | 32.8299 | -1.7885 | 26.4162 |
| 25 | -1.788 | 32.8299 | -1.7884 | 26.4162 |
| 30 | -1.7876 | 32.8299 | -1.7881 | 26.4163 |
| 35 | -1.7876 | 32.8299 | -1.7882 | 26.4162 |
| 40 | -1.7877 | 32.8301 | -1.7884 | 26.4164 |
| 45 | -1.788 | 32.8302 | -1.7887 | 26.4165 |
| 50 | -1.7883 | 32.8306 | -1.7891 | 26.4168 |
| 55 | -1.7878 | 32.8301 | -1.7886 | 26.4164 |
| 60 | -1.7877 | 32.8301 | -1.7887 | 26.4164 |
| 65 | -1.7887 | 32.831 | -1.7897 | 26.4172 |
| 70 | -1.789 | 32.8317 | -1.7901 | 26.4177 |
| 75 | -1.7886 | 32.831 | -1.7899 | 26.4171 |
| 80 | -1.7885 | 32.8316 | -1.7898 | 26.4177 |
| 85 | -1.7888 | 32.8359 | -1.7902 | 26.4211 |
| 90 | -1.789 | 32.8358 | -1.7905 | 26.4211 |
| 95 | -1.789 | 32.8361 | -1.7906 | 26.4213 |
| 100 | -1.7883 | 32.8386 | -1.7899 | 26.4233 |
| 105 | -1.786 | 32.8474 | -1.7878 | 26.4305 |
| 110 | -1.7756 | 32.8599 | -1.7775 | 26.4404 |
| 115 | -1.7626 | 32.8754 | -1.7645 | 26.4527 |
| 120 | -1.7189 | 32.897 | -1.721 | 26.4693 |
| 125 | -1.6162 | 32.9514 | -1.6185 | 26.5111 |
| 130 | -1.4197 | 33.0092 | -1.4224 | 26.5528 |
| 135 | -1.2003 | 33.1344 | -1.2033 | 26.6479 |
| 140 | -0.9317 | 33.1394 | -0.9352 | 26.6432 |
| 145 | -0.8654 | 33.2333 | -0.8692 | 26.7168 |

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 150 | -0.4784 | 33.4102 | -0.4829 | 26.8447 |
| 155 | 0.0556 | 33.3598 | 0.0504 | 26.7796 |

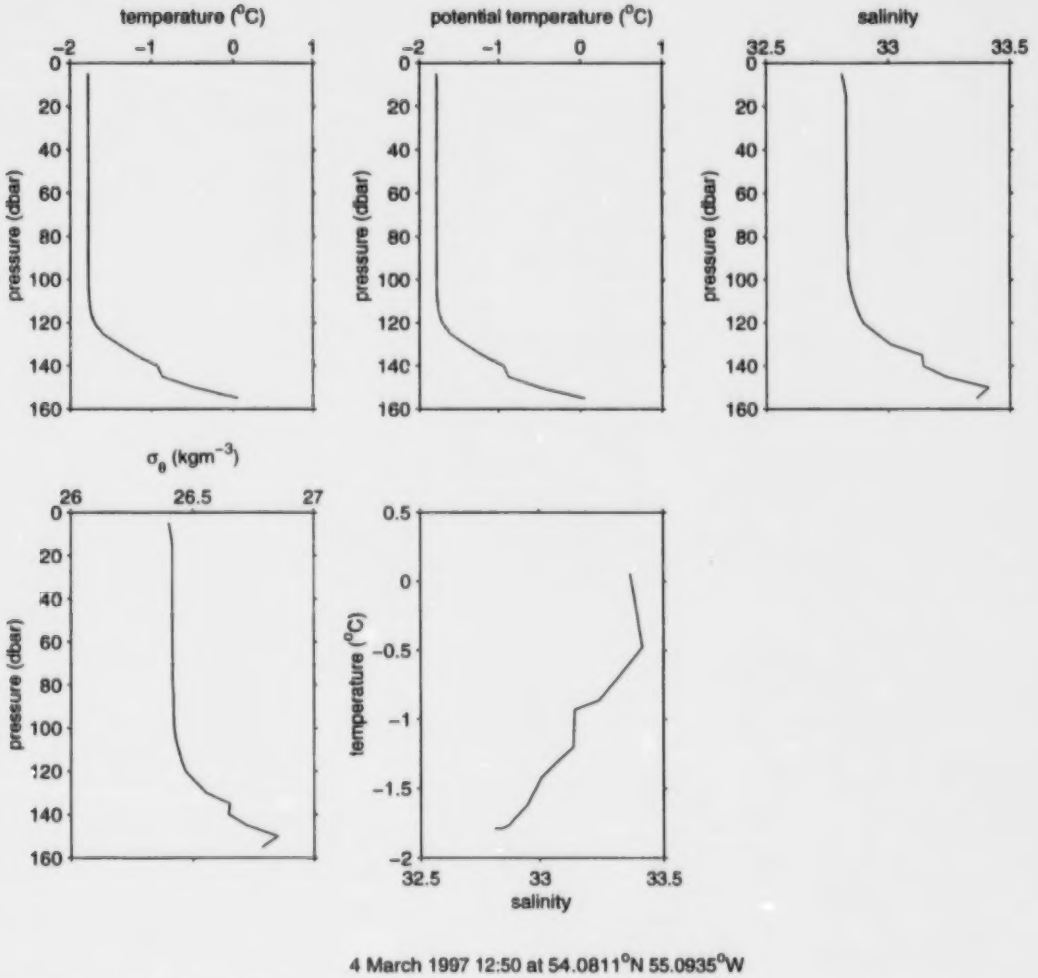


**Figure 13.4.2 1997 station 2 CTD and T-S profiles, upcast**

### 13.4.3 1997 station 3

FILE SPECIFICATION = CTD_97906_3P_3_DN.ODF
CRUISE_NUMBER = 97906
CRUISE_NAME = HAMILTON BANK
CRUISE_DESCRIPTION = LABRADOR 1997
START_DATE_TIME = 4-MAR-1997 14:16:30.75
END DATE TIME = 4-MAR-1997 14:19:42.00
INITIAL LATITUDE = 54.0115
INITIAL LONGITUDE = -55.3030
END LATITUDE = 54.0115
END LONGITUDE = -55.3030
MIN DEPTH = 1.5
MAX DEPTH = 148.7
SAMPLING INTERVAL = 0.25000000
SOUNDING = 150.0
EVENT COMMENTS = 28-MAY-1997 13:26:13 ICE THICKNESS 150-200 CM
EVENT COMMENTS = 28-MAY-1997 13:26:13 SOME FLOES 3+ METERS
EVENT COMMENTS = 28-MAY-1997 13:26:13 TANG S ICE MELT BEACON INSTALLED
EVENT COMMENTS = 28-MAY-1997 13:26:13 CAST 03
EVENT COMMENTS = 29-MAY-1997 09:12:11 PRESSURE OFFSET OF 1.094 ADDED

**Table 13.4.3.1 1997 CTD station 3, downcast data**

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 5 | -1.7826 | | -1.7826 | |
| 10 | -1.7824 | | -1.7825 | |
| 15 | -1.7825 | | -1.7826 | |
| 20 | -1.7824 | | -1.7827 | |
| 25 | -1.7820 | | -1.7824 | |
| 30 | -1.7813 | | -1.7817 | |
| 35 | -1.7812 | | -1.7818 | |
| 40 | -1.7800 | | -1.7807 | |
| 45 | -1.7781 | 32.8642 | -1.7788 | 26.4439 |
| 50 | -1.7768 | 32.8618 | -1.7776 | 26.4419 |
| 55 | -1.7761 | 32.8608 | -1.7770 | 26.4411 |
| 60 | -1.7751 | 32.8597 | -1.7761 | 26.4402 |
| 65 | -1.7745 | 32.8595 | -1.7755 | 26.4400 |
| 70 | -1.7740 | 32.8595 | -1.7751 | 26.4400 |
| 75 | -1.7715 | 32.8594 | -1.7727 | 26.4399 |
| 80 | -1.7730 | 32.8594 | -1.7744 | 26.4399 |
| 85 | -1.7715 | 32.8592 | -1.7729 | 26.4397 |
| 90 | -1.7717 | 32.8595 | -1.7732 | 26.4399 |
| 95 | -1.7727 | 32.8594 | -1.7743 | 26.4399 |
| 100 | -1.7720 | 32.8593 | -1.7737 | 26.4398 |
| 105 | -1.7687 | 32.8592 | -1.7705 | 26.4397 |
| 110 | -1.7335 | 32.8620 | -1.7354 | 26.4412 |
| 115 | -1.6661 | 32.8641 | -1.6682 | 26.4413 |
| 120 | -1.4564 | 32.9462 | -1.4588 | 26.5027 |
| 125 | -0.6243 | 32.9812 | -0.6277 | 26.5032 |
| 130 | -0.3468 | 33.1153 | -0.3507 | 26.6008 |
| 135 | -0.1788 | 33.1814 | -0.1830 | 26.6468 |
| 140 | -0.1322 | 33.3071 | -0.1368 | 26.7461 |
| 145 | -0.1451 | 33.3160 | -0.1497 | 26.7539 |

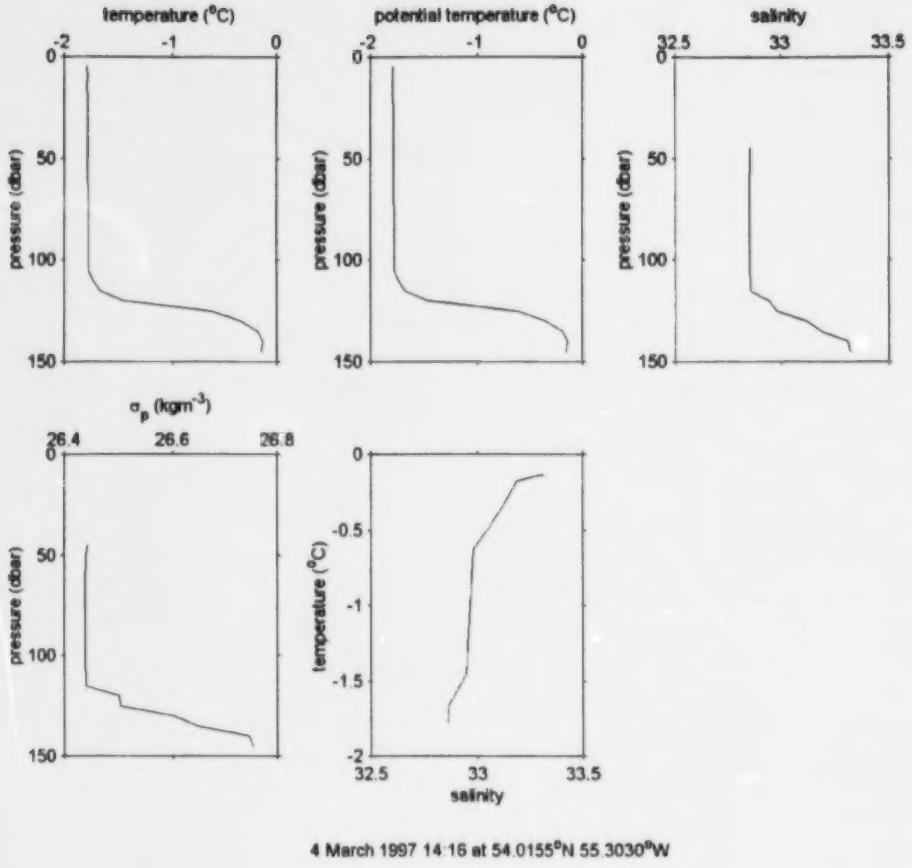


**Figure 13.4.3.1 1997 station 3 CTD and T-S profiles, downcast**

FILE SPECIFICATION = CTD_97906_3P_3_UP.ODF
CRUISE_NUMBER = 97906
CRUISE_NAME = HAMILTON BANK
CRUISE_DESCRIPTION = LABRADOR 1997
START_DATE_TIME = 4-MAR-1997 14:19:47.25
END DATE TIME = 4-MAR-1997 14:27:11.25
INITIAL LATITUDE = 54.0115
INITIAL LONGITUDE = -55.3030
END LATITUDE = 54.0115
END LONGITUDE = -55.3030
MIN DEPTH = 1.3
MAX DEPTH = 148.7
SAMPLING INTERVAL = 0.25000000
SOUNDING = 150.0
EVENT COMMENTS = 28-MAY-1997 13:26:13 ICE THICKNESS 150-200 CM
EVENT COMMENTS = 28-MAY-1997 13:26:13 SOME FLOES 3+ METERS
EVENT COMMENTS = 28-MAY-1997 13:26:13 TANG S ICE MELT BEACON INSTALLED
EVENT COMMENTS = 28-MAY-1997 13:26:13 CAST 03
EVENT COMMENTS = 29-MAY-1997 13:44:58 PRESSURE OFFSET OF 1.094 ADDED

**Table 13.4.3.2 1997 CTD station 3, upcast data**

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^3$) |
|---|---|---|---|---|
| 5 | -1.7836 | | -1.7836 | |
| 10 | -1.7829 | | -1.7830 | |
| 15 | -1.7830 | | -1.7832 | |
| 20 | -1.7825 | | -1.7827 | |
| 25 | -1.7824 | | -1.7827 | |
| 30 | -1.7816 | | -1.7821 | |
| 35 | -1.7798 | 32.8674 | -1.7803 | 26.4465 |
| 40 | -1.7778 | 32.8633 | -1.7784 | 26.4431 |
| 45 | -1.7773 | 32.8617 | -1.7780 | 26.4419 |
| 50 | -1.7774 | 32.8606 | -1.7782 | 26.4410 |
| 55 | -1.7756 | 32.8619 | -1.7765 | 26.4420 |
| 60 | -1.7717 | 32.8602 | -1.7727 | 26.4405 |
| 65 | -1.7729 | 32.8600 | -1.7739 | 26.4404 |
| 70 | -1.7734 | 32.8602 | -1.7746 | 26.4406 |
| 75 | -1.7726 | 32.8603 | -1.7738 | 26.4406 |
| 80 | -1.7723 | 32.8607 | -1.7737 | 26.4409 |
| 85 | -1.7710 | 32.8607 | -1.7724 | 26.4409 |
| 90 | -1.7717 | 32.8614 | -1.7732 | 26.4415 |
| 95 | -1.7710 | 32.8626 | -1.7726 | 26.4425 |
| 100 | -1.7708 | 32.8632 | -1.7725 | 26.4429 |
| 105 | -1.7687 | 32.8710 | -1.7704 | 26.4492 |
| 110 | -1.7416 | 32.8828 | -1.7435 | 26.4582 |
| 115 | -1.6686 | 32.9329 | -1.6706 | 26.4972 |
| 120 | -1.4457 | | -1.4482 | |
| 125 | -0.6464 | | -0.6499 | |
| 130 | -0.3585 | 33.1655 | -0.3624 | 26.6419 |
| 135 | -0.1995 | 33.2317 | -0.2038 | 26.6884 |
| 140 | -0.1310 | 33.3147 | -0.1355 | 26.7522 |
| 145 | -0.1412 | 33.3171 | -0.1459 | 26.7547 |

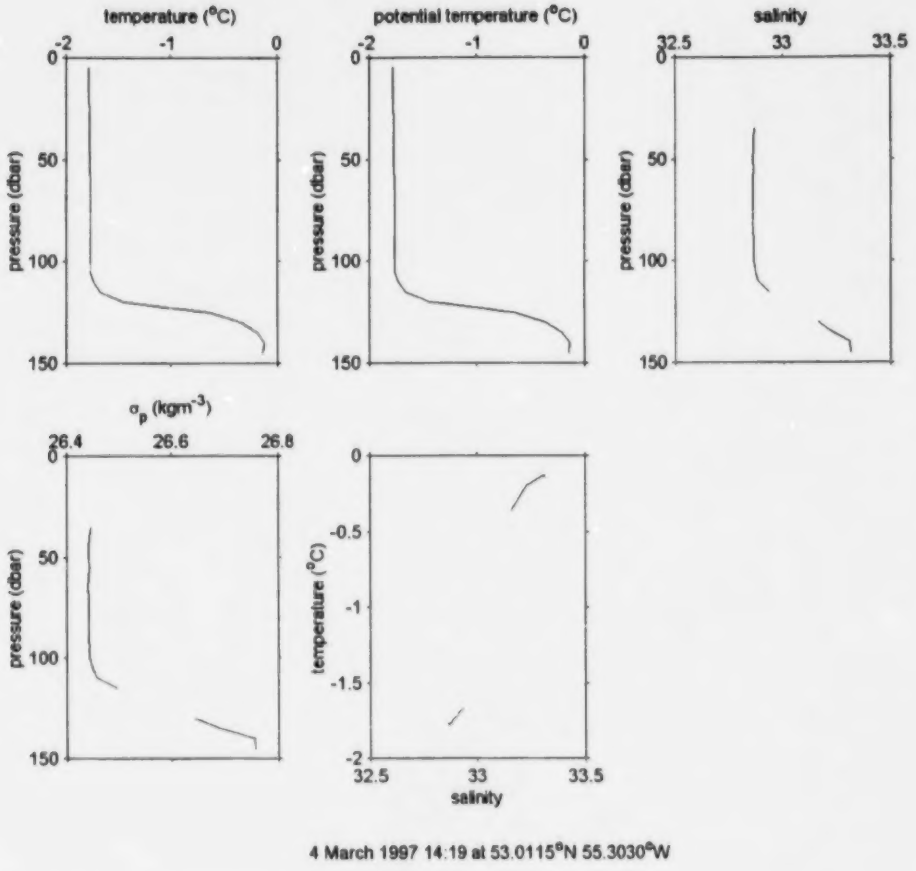


**Figure 13.4.3.2 1997 station 3 CTD and T-S profiles, upcast**

### 13.4.4 1997 station 4

FILE SPECIFICATION = CTD_97906_4P_4_DN.ODF
CRUISE_NUMBER = 97906
CRUISE_NAME = HAMILTON BANK
CRUISE_DESCRIPTION = LABRADOR 1997
START_DATE_TIME = 4-MAR-1997 14:52:30.00
END DATE TIME = 4-MAR-1997 14:55:41.75
INITIAL LATITUDE = 53.9668
INITIAL LONGITUDE = -55.5706
END LATITUDE = 53.9668
END LONGITUDE = -55.5706
MIN DEPTH = 6.6
MAX DEPTH = 194.0
SAMPLING_INTERVA L= 0.25000000
SOUNDING = 200.0
EVENT COMMENTS = 28-MAY-1997 13:34:23 ICE THICKNESS 100 CM
EVENT COMMENTS = 28-MAY-1997 13:34:23 CAST 04
EVENT COMMENTS = 28-MAY-1997 14:45:26 PRESSURE OFFSET OF 0.905 ADDED

**Table 13.4.4.1 1997 CTD station 4, downcast data**

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 10 | -1.7796 | | -1.7797 | |
| 15 | -1.7783 | | -1.7785 | |
| 20 | -1.7781 | | -1.7783 | |
| 25 | -1.7777 | | -1.7781 | |
| 30 | -1.7776 | | -1.7780 | |
| 35 | -1.7781 | | -1.7787 | |
| 40 | -1.7780 | | -1.7787 | |
| 45 | -1.7764 | | -1.7771 | |
| 50 | -1.7744 | 32.8090 | -1.7752 | 26.3989 |
| 55 | -1.7729 | 32.8080 | -1.7738 | 26.3981 |
| 60 | -1.7722 | 32.8075 | -1.7731 | 26.3977 |
| 65 | -1.7729 | 32.8071 | -1.7739 | 26.3974 |
| 70 | -1.7732 | 32.8067 | -1.7744 | 26.3971 |
| 75 | -1.7731 | 32.8061 | -1.7743 | 26.3966 |
| 80 | -1.7721 | 32.8057 | -1.7734 | 26.3962 |
| 85 | -1.7715 | 32.8058 | -1.7729 | 26.3963 |
| 90 | -1.7718 | 32.8055 | -1.7732 | 26.3961 |
| 95 | -1.7717 | 32.8054 | -1.7733 | 26.3959 |
| 100 | -1.7708 | 32.8052 | -1.7725 | 26.3958 |
| 105 | -1.7697 | 32.8050 | -1.7714 | 26.3956 |
| 110 | -1.7678 | 32.8050 | -1.7696 | 26.3955 |
| 115 | -1.7656 | 32.8047 | -1.7676 | 26.3954 |
| 120 | -1.7651 | 32.8062 | -1.7672 | 26.3965 |
| 125 | -1.7688 | 32.8072 | -1.7709 | 26.3974 |
| 130 | -1.7562 | 32.8055 | -1.7584 | 26.3957 |
| 135 | -1.7200 | 32.8073 | -1.7224 | 26.3964 |
| 140 | -1.6682 | 32.8099 | -1.6708 | 26.3973 |
| 145 | -1.6048 | 32.8191 | -1.6075 | 26.4033 |
| 150 | -1.5257 | 32.8116 | -1.5286 | 26.3952 |
| 155 | -1.4168 | 32.8251 | -1.4200 | 26.4033 |
| 160 | -1.2925 | 32.8594 | -1.2960 | 26.4278 |

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 165 | -1.1010 | 32.9100 | -1.1048 | 26.4629 |
| 170 | -1.0473 | 32.9499 | -1.0514 | 26.4936 |
| 175 | -1.0068 | 32.9906 | -1.0111 | 26.5252 |
| 180 | -1.0042 | 33.0009 | -1.0086 | 26.5334 |
| 185 | -0.9733 | 33.0051 | -0.9779 | 26.5359 |
| 190 | -0.9036 | 33.0303 | -0.9085 | 26.5539 |

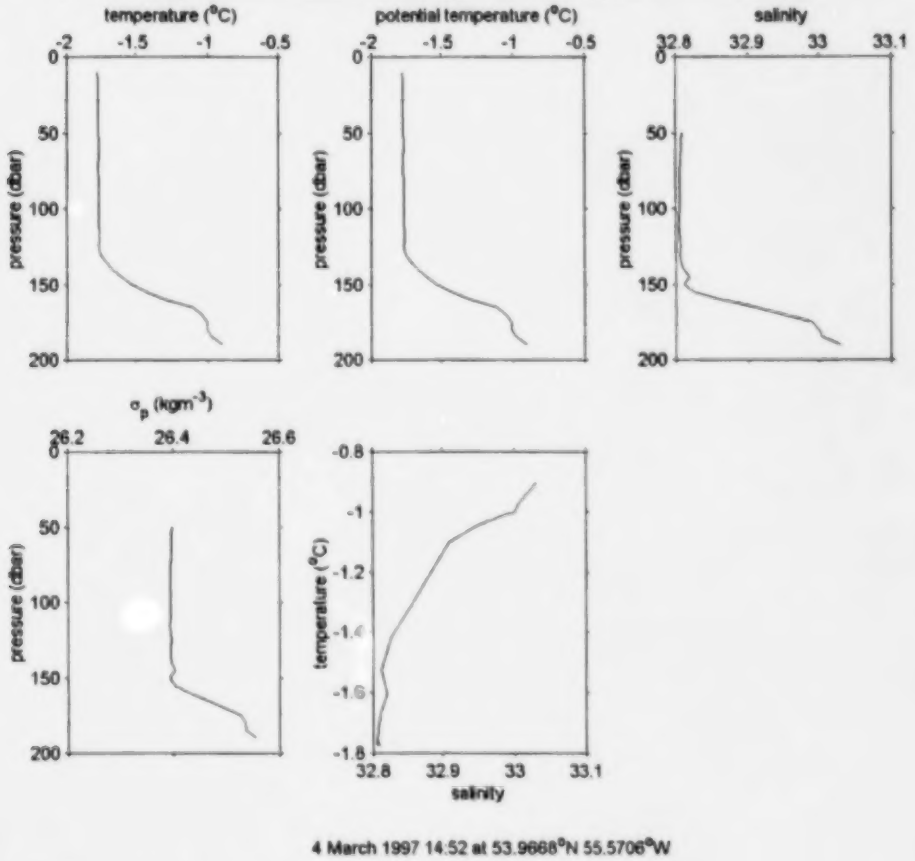


**Figure 13.4.4.1 1997 station 4 CTD and T-S profiles, downcast**

FILE SPECIFICATION =CTD_97906_4P_4_UP.ODF
CRUISE_NUMBER = 97906
CRUISE_NAME = HAMILTON BANK
CRUISE_DESCRIPTION = LABRADOR 1997
START_DATE_TIME = 4-MAR-1997 14:55:40.00
END DATE TIME = 4-MAR-1997 15:03:47.50
INITIAL LATITUDE = 53.9668
INITIAL LONGITUDE = -55.5706
END LATITUDE = 53.9668
END LONGITUDE = -55.5706
MIN DEPTH = 0.3
MAX DEPTH = 194.0
SAMPLING INTERVAL = 0.25000000
SOUNDING = 200.0
EVENT COMMENTS = 28-MAY-1997 13:34:23 ICE THICKNESS 100 CM
EVENT COMMENTS = 28-MAY-1997 13:34:23 CAST 04
EVENT COMMENTS = 29-MAY-1997 14:34:47 PRESSURE OFFSET OF 0.905 ADDED

**Table 13.4.4.2 1997 CTD station 4, upcast data**

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 5 | -1.7777 | 32.8022 | -1.7777 | 26.3935 |
| 10 | -1.7772 | 32.8032 | -1.7774 | 26.3943 |
| 15 | -1.7755 | 32.8051 | -1.7757 | 26.3958 |
| 20 | -1.774 | 32.8047 | -1.7743 | 26.3954 |
| 25 | -1.7735 | 32.8049 | -1.7738 | 26.3956 |
| 30 | -1.7711 | 32.8048 | -1.7715 | 26.3954 |
| 35 | -1.7706 | 32.8044 | -1.7711 | 26.3951 |
| 40 | -1.7715 | 32.8042 | -1.7721 | 26.395 |
| 45 | -1.772 | 32.8042 | -1.7727 | 26.395 |
| 50 | -1.7727 | 32.8042 | -1.7735 | 26.3951 |
| 55 | -1.7726 | 32.8045 | -1.7735 | 26.3953 |
| 60 | -1.7713 | 32.8039 | -1.7723 | 26.3948 |
| 65 | -1.7719 | 32.8042 | -1.773 | 26.395 |
| 70 | -1.772 | 32.8044 | -1.7731 | 26.3952 |
| 75 | -1.772 | 32.8038 | -1.7732 | 26.3947 |
| 80 | -1.7729 | 32.8045 | -1.7742 | 26.3953 |
| 85 | -1.7709 | 32.8043 | -1.7723 | 26.3951 |
| 90 | -1.7705 | 32.8051 | -1.772 | 26.3957 |
| 95 | -1.7682 | 32.8035 | -1.7698 | 26.3944 |
| 100 | -1.7712 | 32.8051 | -1.7729 | 26.3957 |
| 105 | -1.7677 | 32.8044 | -1.7695 | 26.3951 |
| 110 | -1.7705 | 32.8048 | -1.7724 | 26.3955 |
| 115 | -1.7672 | 32.8091 | -1.7691 | 26.3989 |
| 120 | -1.7516 | 32.8104 | -1.7536 | 26.3996 |
| 125 | -1.7399 | 32.806 | -1.742 | 26.3958 |
| 130 | -1.7545 | 32.8109 | -1.7568 | 26.4001 |
| 135 | -1.7354 | 32.8303 | -1.7378 | 26.4154 |
| 140 | -1.6907 | 32.8326 | -1.6932 | 26.4162 |
| 145 | -1.5964 | 32.8686 | -1.5991 | 26.4433 |
| 150 | -1.4044 | 32.8966 | -1.4075 | 26.461 |
| 155 | -1.3255 | 32.8857 | -1.3288 | 26.45 |
| 160 | -1.2219 | 32.9519 | -1.2255 | 26.5006 |
| 165 | -1.1038 | 32.9563 | -1.1077 | 26.5006 |

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 170 | -1.0611 | 32.9766 | -1.0652 | 26.5157 |
| 175 | -1.0132 | 32.9984 | -1.0175 | 26.5317 |
| 180 | -1.0058 | 33.0078 | -1.0102 | 26.5391 |
| 185 | -0.9829 | 33.0366 | -0.9875 | 26.5617 |
| 190 | -0.9076 | 33.0508 | -0.9125 | 26.5706 |

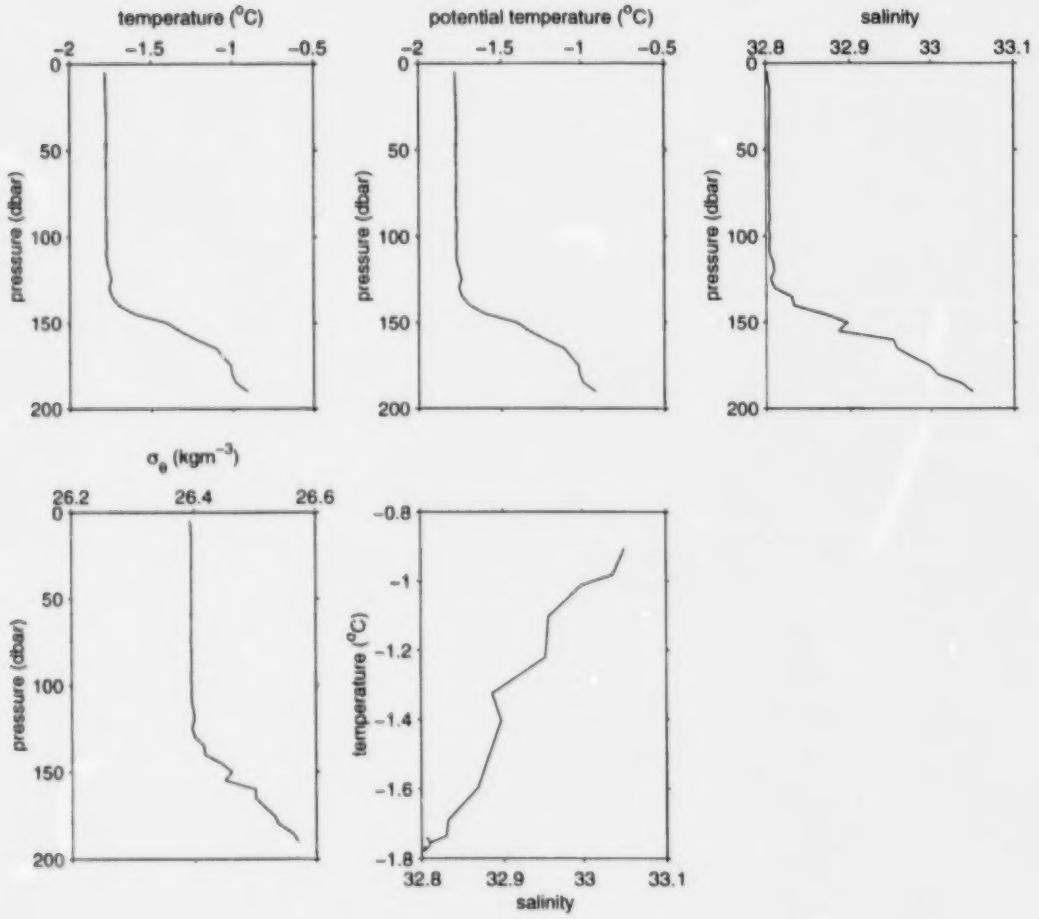


**Figure 13.4.4.2 1997 station 4 CTD and T-S profiles, upcast**

### 13.4.5 1997 station 5

FILE SPECIFICATION = CTD_97906_5P_5_DN.ODF
CRUISE_NUMBER = 97906
CRUISE_NAME = HAMILTON BANK
CRUISE_DESCRIPTION = LABRADOR 1997
START_DATE_TIME = 4-MAR-1997 18:13:57.75
END DATE TIME = 4-MAR-1997 18:17:08.75
INITIAL LATITUDE = 53.8913
INITIAL LONGITUDE = -55.8305
END LATITUDE = 53.8913
END LONGITUDE = -55.8305
MIN DEPTH = 1.5
MAX DEPTH = 153.3
SAMPLING INTERVAL = 0.25000000
SOUNDING = 150.0
EVENT COMMENTS =28-MAY-1997 13:38:34 ICE THICKNESS 60 CM
EVENT COMMENTS =28-MAY-1997 13:38:34 CAST 05
EVENT COMMENTS =28-MAY-1997 14:46:46 PRESSURE OFFSET OF 1.094 ADDED

**Table 13.4.5.1 1997 CTD station 5, downcast data**

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 5 | -1.7874 | | -1.7875 | |
| 10 | -1.7876 | | -1.7877 | |
| 15 | -1.7876 | | -1.7877 | |
| 20 | -1.7876 | | -1.7877 | |
| 25 | -1.7876 | | -1.7877 | |
| 30 | -1.7876 | | -1.7877 | |
| 35 | -1.7876 | | -1.7879 | |
| 40 | -1.7876 | | -1.7881 | |
| 45 | -1.7870 | 32.8227 | -1.7877 | 26.4104 |
| 50 | -1.7868 | 32.8223 | -1.7876 | 26.4101 |
| 55 | -1.7863 | 32.8248 | -1.7872 | 26.4120 |
| 60 | -1.7858 | 32.8268 | -1.7867 | 26.4137 |
| 65 | -1.7849 | 32.8288 | -1.7859 | 26.4153 |
| 70 | -1.7841 | 32.8319 | -1.7852 | 26.4178 |
| 75 | -1.7837 | 32.8320 | -1.7849 | 26.4179 |
| 80 | -1.7835 | 32.8342 | -1.7848 | 26.4196 |
| 85 | -1.7835 | 32.8409 | -1.7849 | 26.4251 |
| 90 | -1.7834 | 32.8442 | -1.7849 | 26.4278 |
| 95 | -1.7840 | 32.8467 | -1.7856 | 26.4298 |
| 100 | -1.7858 | 32.8499 | -1.7875 | 26.4325 |
| 105 | -1.7872 | 32.8546 | -1.7889 | 26.4363 |
| 110 | -1.7876 | 32.8574 | -1.7894 | 26.4387 |
| 115 | -1.7850 | 32.8610 | -1.7869 | 26.4415 |
| 120 | -1.7835 | 32.8631 | -1.7856 | 26.4432 |
| 125 | -1.7834 | 32.8641 | -1.7855 | 26.4439 |
| 130 | -1.7845 | 32.8645 | -1.7867 | 26.4443 |
| 135 | -1.7842 | 32.8667 | -1.7865 | 26.4461 |
| 140 | -1.7827 | 32.8698 | -1.7851 | 26.4486 |
| 145 | -1.7823 | 32.8753 | -1.7848 | 26.4531 |
| 150 | -1.7851 | 32.8872 | -1.7877 | 26.4628 |

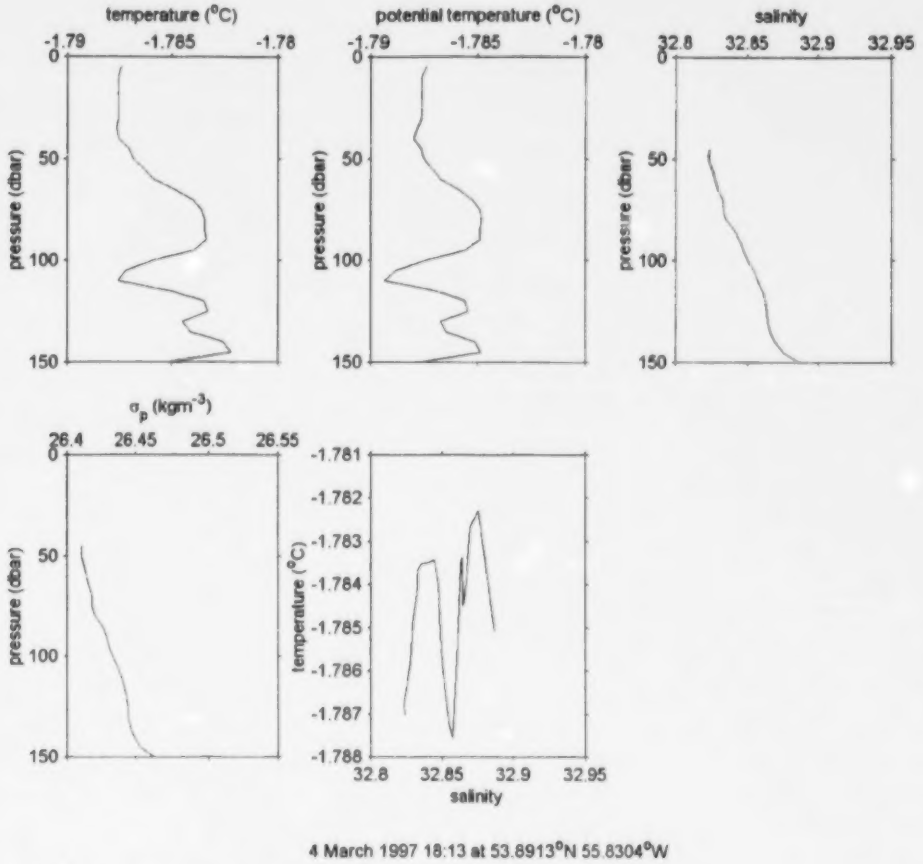


**Figure 13.4.5.1 1997 station 5 CTD and T-S profiles, downcast**

FILE SPECIFICATION = CTD_97906_5P_5_UP.ODF
CRUISE_NUMBER = 97906
CRUISE_NAME = HAMILTON BANK
CRUISE_DESCRIPTION = LABRADOR 1997
START_DATE_TIME = 4-MAR-1997 18:17:45.25
END DATE TIME = 4-MAR-1997 18:23:36.25
INITIAL LATITUDE = 53.8913
INITIAL LONGITUDE = -55.8305
END LATITUDE = 53.8913
END LONGITUDE = -55.8305
MIN DEPTH = 0.6
MAX DEPTH = 152.4
SAMPLING INTERVAL = 0.25000000
SOUNDING = 150.
EVENT COMMENTS = 28-MAY-1997 13:38:34 ICE THICKNESS 60 CM
EVENT COMMENTS = 28-MAY-1997 13:38:34 CAST 05',
EVENT COMMENTS = 2-JUN-1997 09:35:47 PRESSURE OFFSET OF 1.094 ADDED

**Table 13.4.5.2 1997 CTD station 5, upcast data**

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 5 | -1.7868 | 32.8141 | -1.7868 | 26.4034 |
| 10 | -1.7869 | 32.8152 | -1.787 | 26.4042 |
| 15 | -1.7868 | 32.8165 | -1.787 | 26.4053 |
| 20 | -1.7867 | 32.8169 | -1.787 | 26.4056 |
| 25 | -1.7865 | 32.8165 | -1.7869 | 26.4053 |
| 30 | -1.7866 | 32.8167 | -1.787 | 26.4055 |
| 35 | -1.7868 | 32.8171 | -1.7873 | 26.4058 |
| 40 | -1.7869 | 32.8173 | -1.7875 | 26.406 |
| 45 | -1.7872 | 32.8168 | -1.7879 | 26.4056 |
| 50 | -1.7872 | 32.817 | -1.788 | 26.4057 |
| 55 | -1.7873 | 32.8174 | -1.7881 | 26.4061 |
| 60 | -1.7871 | 32.8168 | -1.788 | 26.4056 |
| 65 | -1.7874 | 32.8184 | -1.7884 | 26.4069 |
| 70 | -1.7875 | 32.8204 | -1.7886 | 26.4085 |
| 75 | -1.787 | 32.822 | -1.7882 | 26.4098 |
| 80 | -1.787 | 32.8245 | -1.7883 | 26.4118 |
| 85 | -1.7857 | 32.8298 | -1.7871 | 26.4161 |
| 90 | -1.7839 | 32.841 | -1.7854 | 26.4252 |
| 95 | -1.784 | 32.8449 | -1.7855 | 26.4284 |
| 100 | -1.7843 | 32.8487 | -1.786 | 26.4315 |
| 105 | -1.7856 | 32.8521 | -1.7874 | 26.4342 |
| 110 | -1.7872 | 32.8559 | -1.7891 | 26.4374 |
| 115 | -1.7881 | 32.8595 | -1.79 | 26.4403 |
| 120 | -1.7862 | 32.8632 | -1.7882 | 26.4433 |
| 125 | -1.7853 | 32.8642 | -1.7874 | 26.4441 |
| 130 | -1.7849 | 32.8644 | -1.7871 | 26.4443 |
| 135 | -1.7853 | 32.8665 | -1.7876 | 26.446 |
| 140 | -1.7835 | 32.8708 | -1.7859 | 26.4494 |
| 145 | -1.7826 | 32.8776 | -1.7852 | 26.4549 |
| 150 | -1.7852 | 32.8874 | -1.7878 | 26.463 |

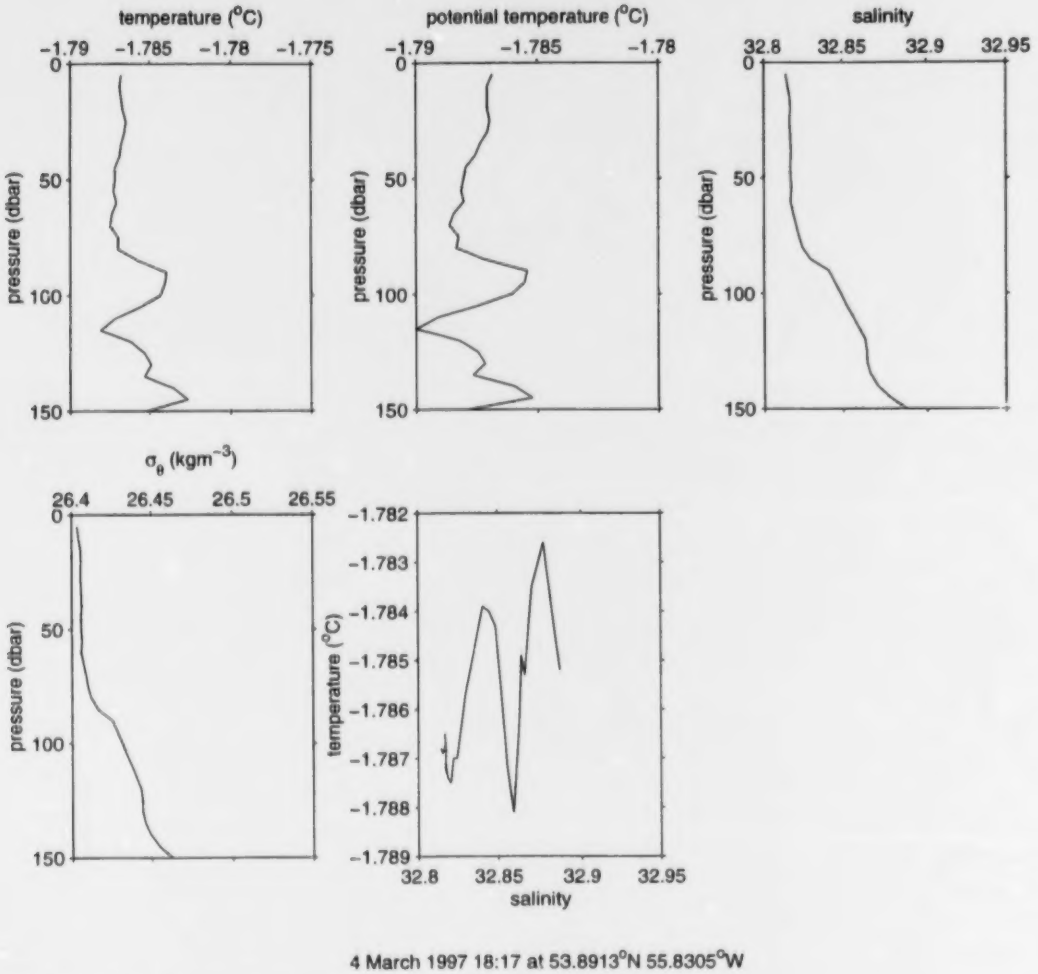


**Figure 13.4.5.2 1997 station 5 CTD and T-S profiles, upcast**

### 13.4.6 1997 station 6

FILE SPECIFICATION = CTD_97906_6P_6_DN.ODF
CRUISE_NUMBER = 97906
CRUISE_NAME = HAMILTON BANK
CRUISE_DESCRIPTION = LABRADOR 1997
START_DATE_TIME = 4-MAR-1997 18:43:30.25
END DATE TIME = 4-MAR-1997 18:46:55.00
INITIAL LATITUDE = 53.8593
INITIAL LONGITUDE = -56.0278
END LATITUDE = 53.8593
END LONGITUDE = -56.0278
MIN DEPTH = 0.5
MAX DEPTH = 101.1
SAMPLING INTERVAL = 0.25000000
SOUNDING = 90.0
EVENT COMMENTS = 28-MAY-1997 13:55:29 ICE THICKNESS 60 CM
EVENT COMMENTS = 28-MAY-1997 13:55:29 CAST 06
EVENT COMMENTS = 28-MAY-1997 14:47:48 PRESSURE OFFSET OF 1.000 ADDED

**Table 13.4.6.1 1997 CTD station 6, downcast data**

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 5 | -1.8026 | | -1.8026 | |
| 10 | -1.8025 | | -1.8026 | |
| 15 | -1.8026 | | -1.8028 | |
| 20 | -1.8028 | 32.9206 | -1.8031 | 26.4902 |
| 25 | -1.8027 | 32.9208 | -1.8031 | 26.4904 |
| 30 | -1.8026 | 32.9212 | -1.8031 | 26.4908 |
| 35 | -1.8026 | 32.9217 | -1.8031 | 26.4912 |
| 40 | -1.8027 | 32.9214 | -1.8034 | 26.4910 |
| 45 | -1.8032 | 32.9207 | -1.8039 | 26.4904 |
| 50 | -1.8032 | 32.9209 | -1.8040 | 26.4905 |
| 55 | -1.8040 | 32.9244 | -1.8048 | 26.4934 |
| 60 | -1.8034 | 32.9243 | -1.8044 | 26.4934 |
| 65 | -1.8035 | 32.9257 | -1.8045 | 26.4945 |
| 70 | -1.8036 | 32.9278 | -1.8048 | 26.4962 |
| 75 | -1.8035 | 32.9325 | -1.8047 | 26.5000 |
| 80 | -1.8029 | 32.9338 | -1.8042 | 26.5010 |
| 85 | -1.8025 | 32.9346 | -1.8039 | 26.5017 |
| 90 | -1.8024 | 32.9343 | -1.8039 | 26.5015 |
| 95 | -1.8024 | 32.9344 | -1.8039 | 26.5015 |
| 100 | -1.8026 | 32.9347 | -1.8042 | 26.5018 |

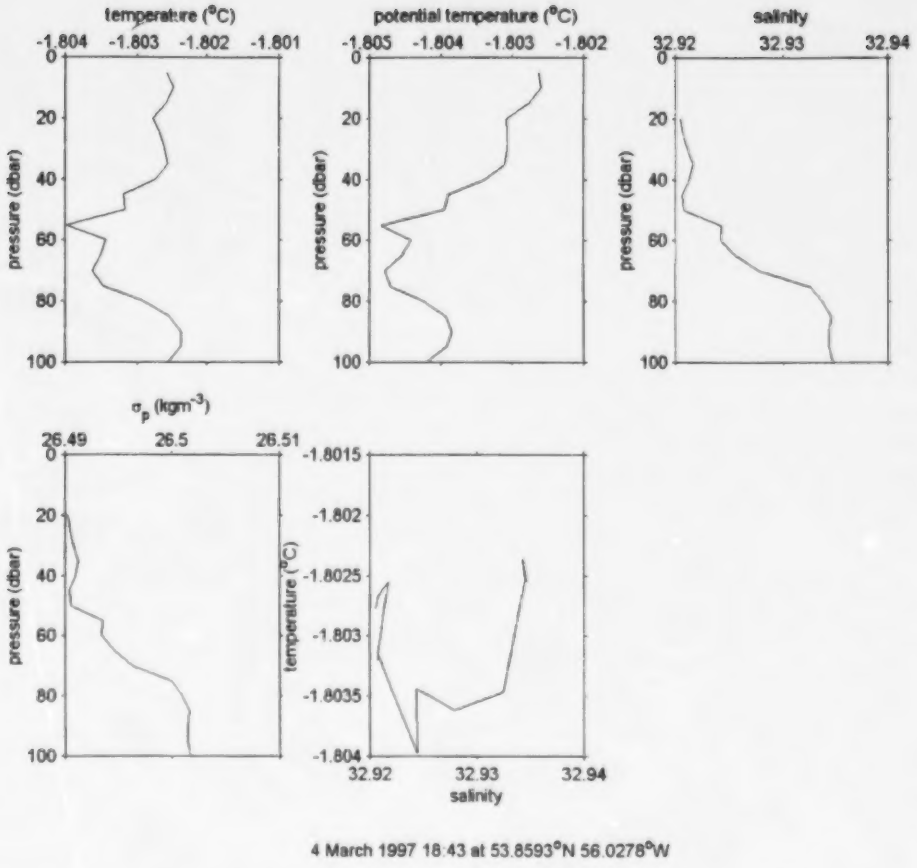


**Figure 13.4.6.1 1997 station 6 CTD and T-S profiles, downcast**

FILE SPECIFICATION = CTD_97906_6P_6_UP.ODF
CRUISE_NUMBER = 97906
CRUISE_NAME = HAMILTON BANK
CRUISE_DESCRIPTION = LABRADOR 1997
START_DATE_TIME = 4-MAR-1997 18:47:35.75
END DATE TIME = 4-MAR-1997 18:51:26.00
INITIAL LATITUDE = 53.8593
INITIAL LONGITUDE = -56.0278
END LATITUDE = 53.8593
END LONGITUDE = -56.0278
MIN DEPTH = 0.5
MAX DEPTH = 100.4
SAMPLING INTERVAL = 0.25000000
SOUNDING = 90.0
EVENT COMMENTS = 28-MAY-1997 13:55:29 ICE THICKNESS 60 CM
EVENT COMMENTS = 28-MAY-1997 13:55:29 CAST 06
EVENT COMMENTS = 3-JUN-1997 08:44:16 PRESSURE OFFSET OF 1.000 ADDED

**Table 13.4.6.2 1997 CTD station 6, upcast data**

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 5 | -1.8027 | | -1.8028 | |
| 10 | -1.8028 | | -1.8029 | |
| 15 | -1.8029 | | -1.8031 | |
| 20 | -1.8031 | | -1.8034 | |
| 25 | -1.8030 | | -1.8034 | |
| 30 | -1.8030 | | -1.8035 | |
| 35 | -1.8031 | | -1.8037 | |
| 40 | -1.8032 | | -1.8038 | |
| 45 | -1.8041 | 32.9218 | -1.8048 | 26.4914 |
| 50 | -1.8042 | 32.9222 | -1.8050 | 26.4917 |
| 55 | -1.8036 | 32.9222 | -1.8045 | 26.4916 |
| 60 | -1.8039 | 32.9242 | -1.8049 | 26.4933 |
| 65 | -1.8041 | 32.9268 | -1.8052 | 26.4954 |
| 70 | -1.8043 | 32.9311 | -1.8054 | 26.4989 |
| 75 | -1.8039 | 32.9336 | -1.8051 | 26.5009 |
| 80 | -1.8033 | 32.9344 | -1.8046 | 26.5015 |
| 85 | -1.8031 | 32.9345 | -1.8045 | 26.5016 |
| 90 | -1.8028 | 32.9348 | -1.8043 | 26.5019 |
| 95 | -1.8027 | 32.9350 | -1.8043 | 26.5021 |
| 100 | -1.8027 | 32.9343 | -1.8044 | 26.5015 |

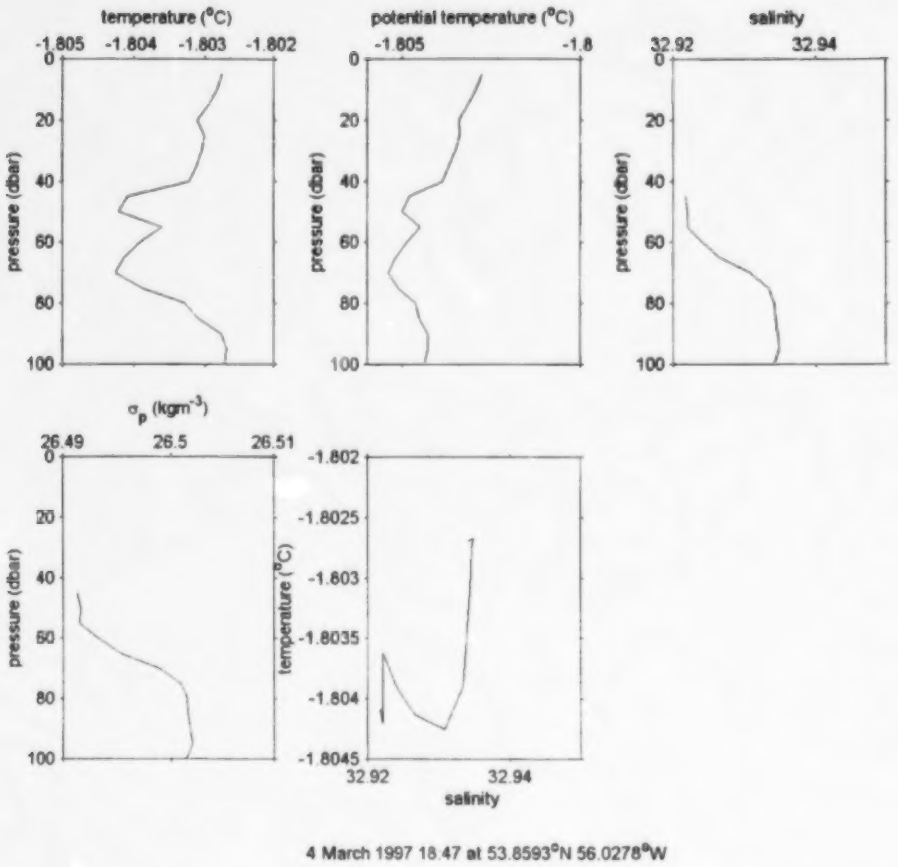


**Figure 13.4.6.2 1997 station 6 CTD and T-S profiles, upcast**

### 13.4.7 1997 station 7

FILE SPECIFICATION = CTD_97906_7P_7_DN.ODF
CRUISE_NUMBER = 97906
CRUISE_NAME = HAMILTON BANK
CRUISE_DESCRIPTION = LABRADOR 1997
START_DATE_TIME = 4-MAR-1997 19:12:08.25
END DATE TIME = 4-MAR-1997 19:13:26.25
INITIAL LATITUDE = 53.8005
INITIAL LONGITUDE = -56.2312
END LATITUDE = 53.8005
END LONGITUDE = -56.2312
MIN DEPTH = 1.8
MAX DEPTH = 67.3
SAMPLING INTERVAL = 0.25000000
SOUNDING = 65.0
EVENT COMMENTS = 28-MAY-1997 14:03:53 ICE THICKNESS 20 CM
EVENT COMMENTS = 28-MAY-1997 14:03:53 CAST 07
EVENT COMMENTS = 29-MAY-1997 09:26:19 PRESSURE OFFSET OF 1.568 ADDED

**Table 13.4.7.1 1997 CTD station 7, downcast data**

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 5 | -1.7679 | | -1.7680 | |
| 10 | -1.7705 | | -1.7706 | |
| 15 | -1.7713 | | -1.7715 | |
| 20 | -1.7718 | | -1.7721 | |
| 25 | -1.7718 | 32.4801 | -1.7722 | 26.1316 |
| 30 | -1.7735 | 32.4879 | -1.7740 | 26.1379 |
| 35 | -1.7760 | 32.5008 | -1.7765 | 26.1485 |
| 40 | -1.7766 | 32.5102 | -1.7772 | 26.1561 |
| 45 | -1.7770 | 32.5181 | -1.7776 | 26.1625 |
| 50 | -1.7777 | 32.5242 | -1.7784 | 26.1675 |
| 55 | -1.7774 | 32.5240 | -1.7783 | 26.1673 |
| 60 | -1.7773 | 32.5242 | -1.7782 | 26.1675 |
| 65 | -1.7779 | 32.5302 | -1.7789 | 26.1724 |

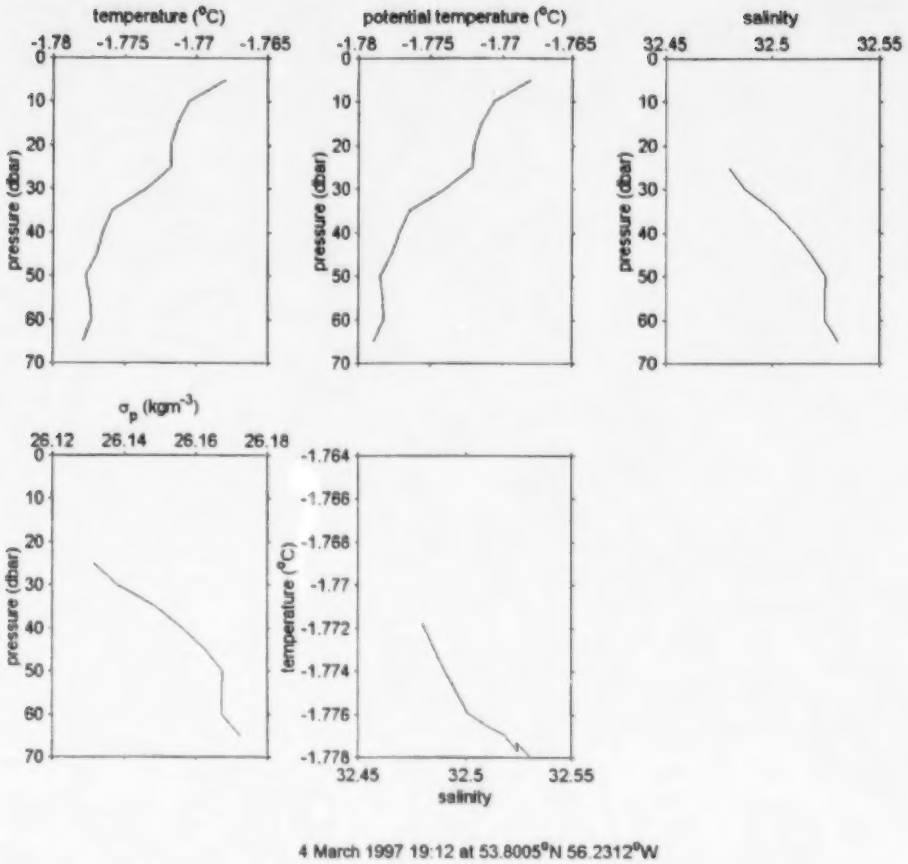


**Figure 13.4.7.1 1997 station 7 CTD and T-S profiles, downcast**

FILE SPECIFICATION = CTD_97906_7P_7_UP.ODF
CRUISE_NUMBER = 97906
CRUISE_NAME = HAMILTON BANK
CRUISE_DESCRIPTION = LABRADOR 1997
START_DATE_TIME = 4-MAR-1997 19:13:52.25
END DATE TIME = 4-MAR-1997 19:16:23.75
INITIAL LATITUDE = 53.8005
INITIAL LONGITUDE = -56.2312
END LATITUDE = 53.8005
END LONGITUDE = -56.2312
MIN DEPTH = 0.5
MAX DEPTH = 67.5
SAMPLING INTERVAL = 0.25000000
SOUNDING = 65.0
EVENT COMMENTS = 28-MAY-1997 14:03:53 ICE THICKNESS 20 CM
EVENT COMMENTS = 28-MAY-1997 14:03:53 CAST 07
EVENT COMMENTS = 29-MAY-1997 15:26:11 PRESSURE OFFSET OF 1.568 ADDED

**Table 13.4.7.2 1997 CTD station 7, upcast data**

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 5 | -1.7642 | 32.4706 | -1.7642 | 26.1236 |
| 10 | -1.7653 | 32.4669 | -1.7654 | 26.1207 |
| 15 | -1.7653 | 32.4716 | -1.7655 | 26.1245 |
| 20 | -1.7688 | 32.4733 | -1.7691 | 26.1259 |
| 25 | -1.7706 | 32.4774 | -1.771 | 26.1293 |
| 30 | -1.7716 | 32.4821 | -1.7721 | 26.1332 |
| 35 | -1.7749 | 32.4971 | -1.7755 | 26.1455 |
| 40 | -1.7759 | 32.5093 | -1.7765 | 26.1553 |
| 45 | -1.7762 | 32.5169 | -1.7768 | 26.1616 |
| 50 | -1.7767 | 32.523 | -1.7775 | 26.1666 |
| 55 | -1.7771 | 32.5234 | -1.778 | 26.1668 |
| 60 | -1.7775 | 32.5252 | -1.7784 | 26.1683 |
| 65 | -1.7781 | 32.5327 | -1.7791 | 26.1744 |

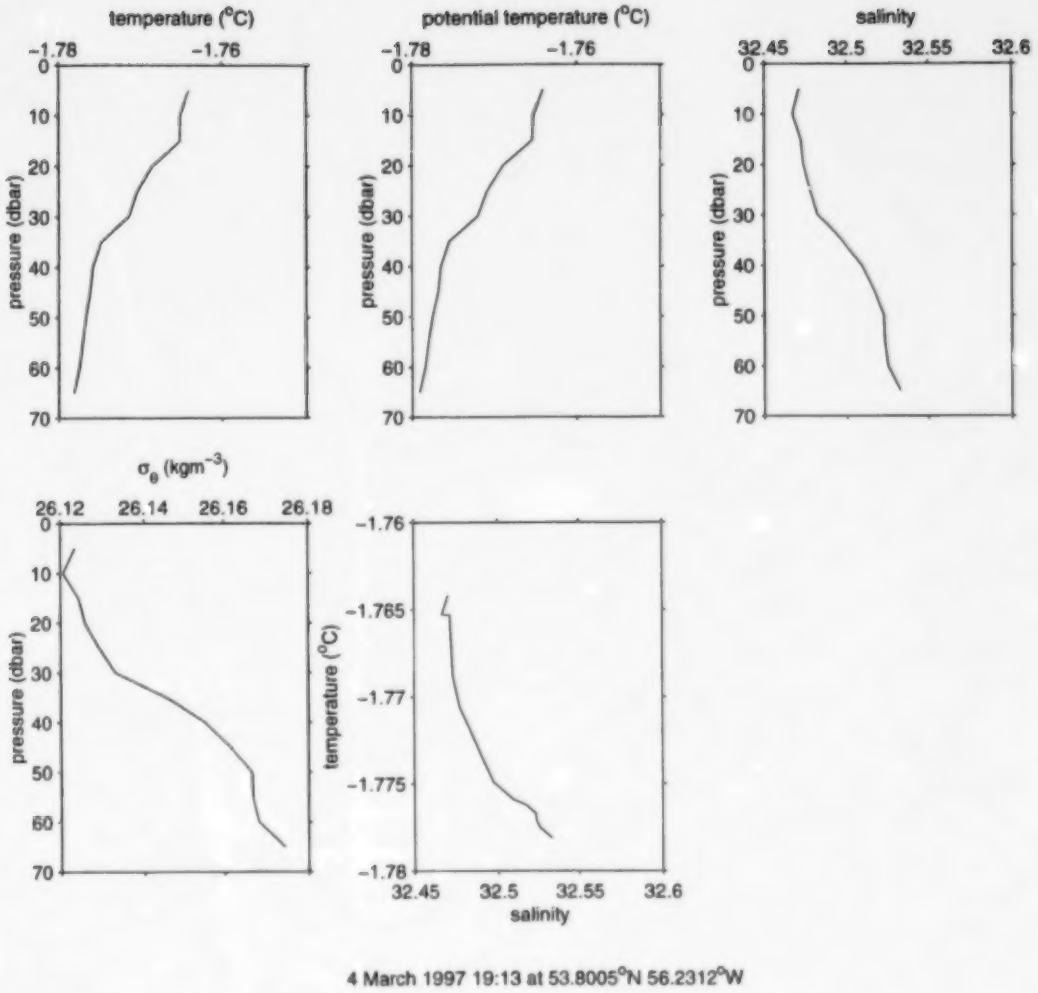


**Figure 13.4.7.2 1997 station 7 CTD and T-S profiles, upcast**

## 13.4 1997 Atmospheric beacon data

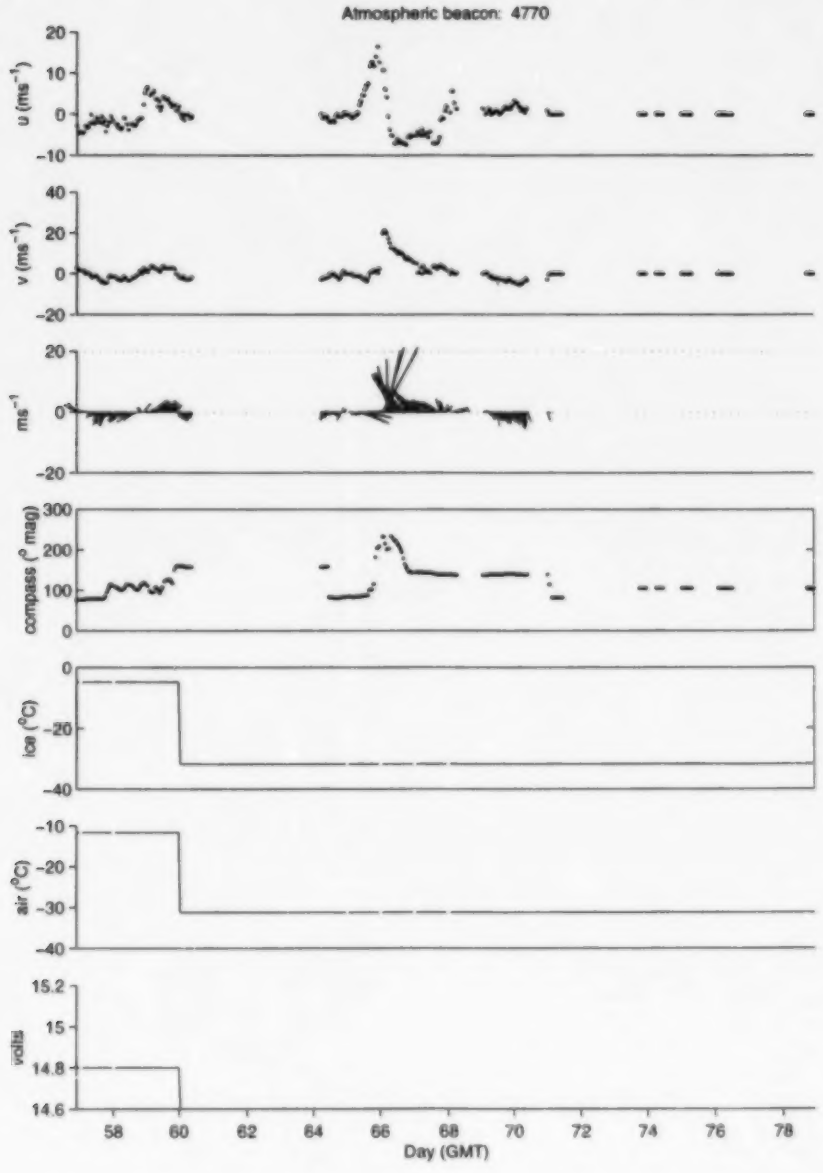


**Figure 13.5.1 1997 atmospheric beacon data from beacon 4770**

# 14 APPENDIX G: 1998 DATA AND PLOTS

## 14.1 1998 Miscellaneous data

**Table 14.1.1 Gulf of St. Lawrence 1998 station data**

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **17.1**<br>Feb. 17<br>(day 48) | • light NW winds<br>• clear, -10°C | • ice thickness: 60, 45, and 59 cm<br>• no snow | • landfast ice off Cape Gage | • 5 cm = 3 psu<br>• 15 cm = 4 psu<br>• 20 cm = 5 psu<br>• 35 cm = 8 psu |
| **18.2**<br>Feb. 18<br>(day 49) | • light NE winds<br>• clear, -2°C | • ice thickness 50, 44, and 44 cm<br>• no snow | • pack-ice off Cape Gage | • 5 cm = 7 psu<br>• 15 cm = 3 psu<br>• 25 cm = 5 psu<br>• 35 cm = 7 psu |
| **18.3**<br>Feb. 18<br>(day 49) | • light NE winds<br>• clear, -2°C | • ice thickness 30 and 30 cm<br>• rough snow-covered floe<br>• 4 cm of snow | • pack-ice off Cape Gage | • snow = 1 psu<br>• 5 cm = 1 psu<br>• 15 cm = 0 psu<br>• 25 cm = 1 psu |
| **18.4**<br>Feb. 18<br>(day 49) | • light NE winds<br>• clear, -2°C | • ice thickness 2$^{+}$m<br>• 500 m x 500 m<br>• rafted floe<br>• 3 cm snow | • pack-ice in Northumberland Strait<br>• NW of Confederation Bridge<br>• beacon 2755 | • 5 cm = 3 psu<br>• 15 cm = 4 psu<br>• 20 cm = 5 psu<br>• 35 cm = 8 psu |
| **18.5**<br>Feb. 18<br>(day 49) | • light NE winds<br>• clear, 2°C | • ice thickness 39 cm<br>• 500 m x 500 m<br>• smooth floe<br>• no snow | • pack-ice in Northumberland Strait<br>• SW of Confederation Bridge<br>• beacon 2756 | • 5 cm = 9 psu<br>• 15 cm = 7 psu<br>• 25 cm = 8 psu |
| **18.6**<br>Feb. 18<br>(day 49) | • light NE winds<br>• clear, 2°C | • ice thickness 2$^{+}$m<br>• 150 m x 250 m<br>• rough, rafted floe<br>• 3 cm snow | • pack-ice in Northumberland Strait<br>• SE of Confederation Bridge<br>• beacon 2754 | |
| **18.7**<br>Feb 18<br>(day 49) | • light NE winds<br>• clear, -2°C | • ice thickness 2$^{+}$m<br>• 150 m x 150 m<br>• large, rough, rafted floe<br>• 3 cm snow | • pack-ice in Northumberland Strait<br>• NE of Confederation Bridge<br>• beacon 2757 | • 5 cm = 1 psu<br>• 15 cm = 4 psu |

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **20.1**<br>Feb. 20<br>(day 51) | • light W winds<br>• cloudy, 0°C | • ridge to the NE at ~200 m from the end of the line (2 bags)<br>• water 2-3 cm on the surface of the ice | • calibration line in Hillsborough Bay<br>• 46°05.1'N, 63°02.9'W in 13.8 to 14.2 m of water<br>• 200 m line with bags and holes at 20 and 5 m intervals | |

| Distance (m) | Site # | Thickness (cm) | Distance (m) | Site # | Thickness (cm) |
|---|---|---|---|---|---|
| 0 | 1 * | 36 | 100 | 21 * | 36 |
| 5 | 2 | 36 | 105 | 22 | 38 |
| 10 | 3 | 37 | 110 | 23 | 40 |
| 15 | 4 | 37 | 115 | 24 | 36 |
| 20 | 5 * | 38 | 120 | 25 * | 36 |
| 25 | 6 | 35 | 125 | 26 | 39 |
| 30 | 7 | 37 | 130 | 27 | 36 |
| 35 | 8 | 38 | 135 | 28 | 36 |
| 40 | 9 * | 37 | 140 | 29 * | 37 |
| 45 | 10 | 39 | 145 | 30 | 38 |
| 50 | 11 | 35 | 150 | 31 | 39 |
| 55 | 12 | 36 | 155 | 32 | 38 |
| 60 | 13 * | 38 | 160 | 33 * | 36 |
| 65 | 14 | 36 | 165 | 34 | 39 |
| 70 | 15 | 38 | 170 | 35 | 36 |
| 75 | 16 | 40 | 175 | 36 | 39 |
| 80 | 17 * | 35 | 180 | 37 * | 38 |
| 85 | 18 | 35 | 185 | 38 | 38 |
| 90 | 19 | 37 | 190 | 39 | 38 |
| 95 | 20 | 35 | 195 | 40 | 38 |
| | | | 200 | 41 ** | 40 |

* indicates that a marker bag was placed at the site

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **20.2**<br>Feb. 20<br>(day 51) | • light W winds<br>• cloudy, 0°C | • rough floe<br>• no snow<br>• ice thickness 2+m<br>• 100 m x 150 m<br>• rafted | • pack-ice in Northumberland Strait<br>• NE of Confederation Bridge<br>• beacon 4459 15:15 AST | |
| **20.3**<br>Feb. 20<br>(day 51) | • light W winds<br>• cloudy, 0°C | • very rough floe<br>• no snow<br>• ice thickness 2+m<br>• 50 m x 50 m<br>• rafted | • pack-ice in Northumberland Strait<br>• SE of Confederation Bridge<br>• beacon 4458 15:30 AST | |
| **21.1**<br>Feb. 21<br>(day 52) | • light W winds<br>• clear, -1°C | • ice thickness 38, 44, and 52 cm<br>• rough floe<br>• 200 m x 200 m | • pack-ice off Cape Gage<br>• beacon 26381 11:30 AST<br>• spots of hard snow, mostly flat slippery ice | |

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **21.2**<br>Feb. 21<br>(day 52) | • light W winds<br>• overcast, 0°C | • rough wind-generated rubble pile, 1 km wide<br>• blocks 20 cm thick have sharp edges | • pack-ice off N coast of PEI<br>• temporary land-fast ice<br>• bright area on RADARSAT image<br>• 2+m thick rafted pans | |

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **22.1**<br>Feb. 22<br>(day 53) | • 20 kph W<br>• clear, -4°C | • frozen surface water<br>• trace of snow | • calibration line 10:30 AST<br>• checked ice thickness at every 40 m site | |

| Distance (m) | Thickness |
|---|---|
| 0 | 36 |
| 40 | 40 |
| 80 | 38 |
| 120 | 39 |
| 160 | 36 |
| 200 | 35 |

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **22.2**<br>Feb. 22<br>(day 53) | • 10 kph W winds<br>• clear, –2°C-0°C | • round 300 m x 300 m<br>• made mostly of flat ice with some snow patches<br>• ice thickness 50/52/53/50 cm | • ice pressure station #1 11:45 AST<br>• beacons 3124, 1055, and 22191 | • 2 cm = 0 psu<br>• 10 cm = 2 psu<br>• 20 cm = 6 psu<br>• from ice at pressure sensors:<br>• 22191 = 4 psu<br>• 1055 = 4 psu |
| **22.3**<br>Feb. 22<br>(day 53) | • 10 kph W winds<br>• clear, –2°C-0°C | • round 500 m x 500 m<br>• made mostly of flat ice with some snow patches<br>• ice thickness 58 and 60 cm | • beacon 3123 at ice pressure station #1 13:00 AST<br>• N corner of triangle | |
| **22.4**<br>Feb. 22<br>(day 53) | • 10 kph W winds<br>• clear, –2°C-0°C | • round 400 m x 400 m<br>• made of rough ice with some snow patches<br>• ice thickness 34 and 38 cm | • beacon 3121 at ice pressure station #1 13:00 AST<br>• SE corner of triangle | |
| **22.5**<br>Feb. 22<br>(day 53) | • 10 kph W winds<br>• clear, –2°C-0°C | • round 500 m x 500 m<br>• made of mostly flat ice with some snow patches<br>• ice thickness 76 and 80 cm | • beacon 3122 at ice pressure station #1 13:00 AST<br>• SW corner of triangle | |

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **22.6**<br>Feb. 22<br>(day 53) | • 10 kph W<br>• clear, -4°C | | • calibration line (16:00)<br>• measured distance to ridge (200 m) from double end-bags | |

**Depths/ice thickness at every 50 m from end of the line to ridge**

| Distance (m) | Depth (m) | Thickness (cm) |
|---|---|---|
| 50 | 13.2 | 41 |
| 100 | 13.1 | 45 |
| 150 | 12.8 | 52 |
| 180 | | 52 |

**No sounding at ridge or ice thickness but several freeboards**

| Distance (m) from and before the ridge | Thickness (cm) |
|---|---|
| 10 | 35 |
| 15 | 23 |
| 20 | 10 |

**Ice thickness behind ridge**

| Distance (m) | Thickness (cm) |
|---|---|
| 20 | 50 |
| 40 | 50 |

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **23.1**<br>Feb. 23<br>(day 54) | • light W winds<br>• clear, -1°C | • oval 100 m x 200 m<br>• ice thickness 55, 65, and 65 cm<br>• no snow | • ice pressure station 11:07 AST<br>• beacons on thicker top segment<br>• beacons 8541, 2364, and 1053<br>• pressure beacon 30 m from edge facing 200° | • 2 cm = 0 psu<br>• 15 cm = 6 psu<br>• 30 cm = 10 psu |
| **23.2**<br>Feb. 23<br>(day 54) | • light W winds<br>• clear, -1°C | • rough 200 m x 200 m<br>• some snow patches<br>• ice thickness 35 and 40 cm | • beacon 8543 at ice pressure station #2 11:15 AST<br>• N corner of triangle | |
| **23.3**<br>Feb. 23<br>(day 54) | • light W winds<br>• clear, -1°C | • large, round, 500 m x 500 m<br>• made of rough ice with some snow patches<br>• ice thickness 50 and 50 cm | • beacon 8542 at ice pressure station #2 11:29 AST<br>• SW corner of triangle | |
| **23.4**<br>Feb. 23<br>(day 54) | • light W winds<br>• clear, -1°C | • round 500m x 500 m<br>• made of mostly flat ice with some snow patches<br>• ice thickness 50 and 50 cm | • beacon 4457 at ice pressure station #2 14:44 AST<br>• SE corner of triangle | |

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **11.1**<br>**11.2**<br>Mar. 11<br>(day 70) | • 15 kph W winds<br>• cloudy, -1°C | | • seal herd locations N of North Point<br>• beacons 26368 (centre) and 26378 (SE) | |
| **11.3**<br>Mar. 11<br>(day 70) | • kph W winds<br>• cloudy, -1°C | | • hooded seal herd location<br>• N of Summerside<br>• beacon 26382 | |
| **14.1**<br>Mar. 14<br>(day 73) | • 10 kph W winds<br>• clear, -10°C | • largest floe 3 m thick<br>• mostly smaller floes<br>• ice thickness 1.5 m at floes, 40 cm between floes<br>• composite floes 2 km x 2 km<br>• at thin large floe, ice thickness from edge into floe every 2 m: 40, 65, 65, 30, 30, 28, 28, 24, and 21 cm | • pancake ice rubble N of North Point<br>• beacon 26380 on pancake ice<br>• 50% water in area<br>• old ice 20%<br>• pancake ice 30%<br>• other similar floes in area | |
| **Lake station**<br>Mar. 16<br>(day 75) | • 10 kph NW<br>• cloudy –6°C | | • Radar Lake:<br>• 5-7 cm of snow<br>• up to 11 cm at places<br>• ice thickness 30/29/30 cm<br>• Small lake<br>• constant snow depths 6-8 cm<br>• ice thickness 17/17/16 cm<br>• Tracadie Bay<br>• ice thickness 36/35/36 cm<br>• snow depths 2-5 cm<br>• black thin snow patches<br>• drifts 8-12 cm | |

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **18.1**<br>Mar. 18<br>(day 77) | • calm<br>• clear, -6°C | • ice thickness 64/75/75 cm So of 3 end-bags<br>• floe 1.03 Nmi wide<br>• thin floe to NW:<br>• ice thickness 15/15/15 cm with 10 cm of snow drifts<br>• old floe has snow drifts to 26 cm approximately 20 m wide | • calibration line SE of Point Egmont at 46°19.91'N, 64°04.5'W<br>• first visit in morning, landed on rafted section of floe<br>• ship track in between at edge of old floe<br>• second visit in afternoon with film crew<br>• end-bags (3) at SE end approximately 300 m from edge<br>• SE end of line ends in wide rubble field 200-300 m wide | |

| Distance (m) | Snow (cm) | Thickness (cm) | Distance (m) | Snow (cm) | Thickness (cm) |
|---|---|---|---|---|---|
| -100 | 15 | 125 | 200 * | 10 | 34 |
| -80 | 5 | 146 | 220 | 10 | 39 |
| -60 | 0 | 160 | 235 * | | |
| -40 | 26 | 50 | 240 | 10 | 38 |
| -20 | 0 | 136 | 260 | 0 | 125 |
| 0 *** | 12 | 34 | 270 * | | |
| 10 | 20 | 37 | 350 | 12 | 42 |
| 20 | 1 | 40 | 370 | 0 | 35 |
| 30 | 20 | 48 | 390 | 0 | 120+ |
| 40 * | 18 | 75 | 410 | 13 | 120+ |
| 50 | 17 | 68 | 430 | 0 | 120+ |
| 60 | 9 | 64 | 450 | 0 | 52 |
| 70 | 8 | 50 | 470 | 0 | 120+ |
| 80 * | 1 | 36 | 490 | 10 | 46 |
| 90 | 15 | 32 | 510 | 0 | 58 |
| 110 | 12 | 40 | 530 | 7 | 34 |
| 130 * | 15 | 32 | 550 | 0 | 36 |
| 140 * | 15 | 30 | 570 | 15 | 32 |
| 160 | 15 | 30 | 590 | 10 | 32 |
| 180 | 15 | 32 | 650 | rubble starts | |

**Table 14.1.2 Labrador Shelf 1998 station data**

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **CTD 4**<br>Mar. 6<br>(day 65) | | | • Hamilton Bank<br>• sounding 200 m<br>• profile to 200 m | |
| **CTD 5**<br>Mar. 6<br>(day 65) | | | • Hamilton Bank<br>• close to ice melt beacon 2753 deployment<br>• sounding ~180 m | |

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **CTD 6**<br>Mar. 6<br>(day 65) | | | • Hamilton Bank<br>• sounding 80 m | |
| **CTD 7**<br>Mar. 6<br>(day 65) | | | • Hamilton Bank<br>• sounding ~70 m | |
| **CTD 2479**<br>Mar. 7<br>(day 66) | | | • Hamilton Bank<br>• at ice melt beacon 2479<br>• sounding ~140 m | |
| **CTD 2374**<br>Mar. 7<br>(day 66) | | | • Hamilton Bank<br>• at ice melt beacon 2374<br>• sounding 200+ m | |
| **7.1**<br>Mar. 7<br>(day 66) | • light NW winds<br>• clear, -5°C | • ice thickness 1.5-2.0 m<br>• snow 7 cm | • southern pressure station<br>• beacons 8546, 4768, and 977 | • snow-top 0.0 psu<br>• 25 cm = 9 psu<br>• 20 cm = 19 psu w<br>• 40 cm = 19 psu w<br>• 55 cm = 19 psu w |
| **7.2**<br>Mar. 7<br>(day 66) | • light NW winds<br>• clear, -5°C | • small 40 m x 40 m<br>• 2+m thick | • beacon 8539 14:50 AST<br>• NE corner of square<br>• 2.1 mi from centre<br>• 50° magnetic | |
| **7.3**<br>Mar. 7<br>(day 66) | • light NW winds<br>• clear, -5°C | • small 30 m x 30 m<br>• 2+m thick | • beacon 8537 15:00 AST<br>• SE corner of square<br>• 2.2 mi from centre<br>• 140° magnetic | |
| **7.4**<br>Mar. 7<br>(day 66) | • light NW winds<br>• clear, -5°C | • small 40 m x 40 m<br>• 2+m thick | • beacon 8545 15:10 AST<br>• SW corner of square<br>• 2.1 mi from centre<br>• 230° magnetic | |
| **7.5**<br>Mar. 7<br>(day 66) | • light NW winds<br>• clear, -5°C | • small 30 m x 30 m<br>• 2+m thick | • beacon 8538 15:20 AST<br>• NW corner of square<br>• 2.2 mi from centre<br>• 320° magnetic | |

| Station | Meteorological | Floe Description | Other Comments | Salinity/Ice Holes |
|---|---|---|---|---|
| **7.6**<br>Mar. 7<br>(day 66) | • light NW winds<br>• clear, -5°C | • ice thickness 1.5-2.0 m<br>• deep snow 30-40 cm | • northern pressure station<br>• beacons 8540, 2362, and 978<br>• temperature chain beacon 4764<br>• pressure beacons away from centre of floe (rafted) | • snow-bottom 0.0 psu<br>• 5 cm = 3 psu<br>• 13 cm = 11 psu<br>• 23 cm = 11 psu w<br>• 30 cm = 20 psu w<br>• 40 cm = 15 psu w |
| **7.7**<br>Mar. 7<br>(day 66) | • light NW winds<br>• clear, -5°C | • small 40 m x 40 m<br>• 2$^{+}$m thick | • beacon 10055<br>• NW corner of square<br>• 2.1 mi from centre<br>• 320° magnetic | |
| **7.8**<br>Mar. 7<br>(day 66) | • light NW winds<br>• clear, -5°C | • small 30 m x 30 m<br>• 2$^{+}$m thick | • beacon 10056<br>• SE corner of square<br>• 2.2 mi from centre<br>• 140° magnetic | |
| **7.9**<br>Mar. 7<br>(day 66) | • light NW winds<br>• clear, -5°C | • small 40 m x 40 m<br>• 2$^{+}$m thick | • beacon 10057<br>• NE corner of square<br>• 2.1 mi from centre<br>• 50° magnetic | |
| **7.10**<br>Mar. 7<br>(day 66) | • light NW winds<br>• clear, -5°C | • small 30 m x 30 m<br>• 2$^{+}$m thick | • beacon 10058<br>• NW corner of square<br>• 2.2 mi from centre<br>• 230° magnetic | |
| **7.11**<br>Mar. 7<br>(day 66) | • light NW winds<br>• clear, -5°C | • small 30 m x 20 m<br>• ice thickness 1.5-2.0 m<br>• snow 25 cm | • ice drift station inshore of northern pressure station<br>• 54°06.0'N, 56°36.0'W at 17:40 AST<br>• beacon 974 | |

## 14.2 1998 Pressure data

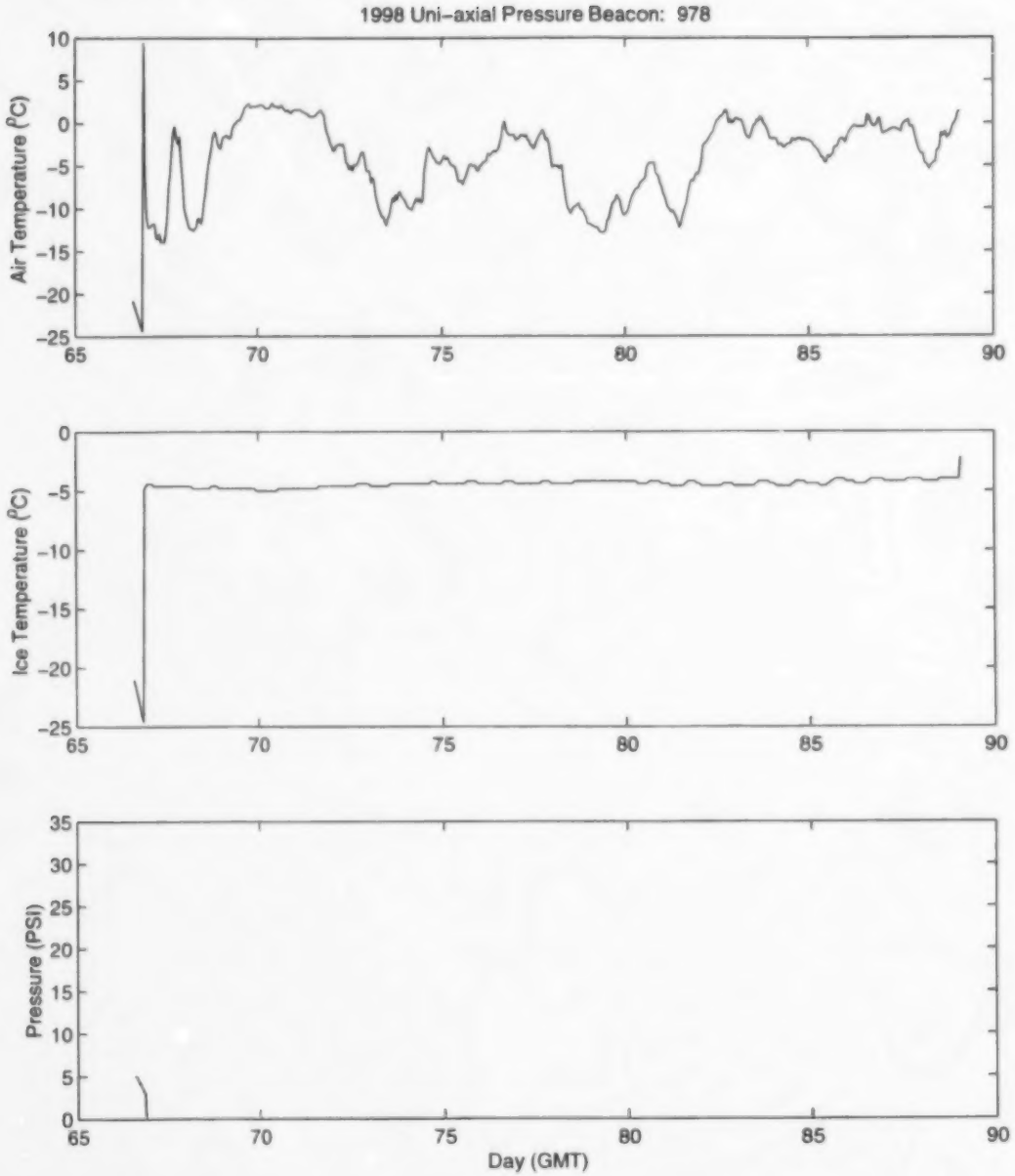


**Figure 14.2.1 1998 data from uni-axial pressure beacon 978**

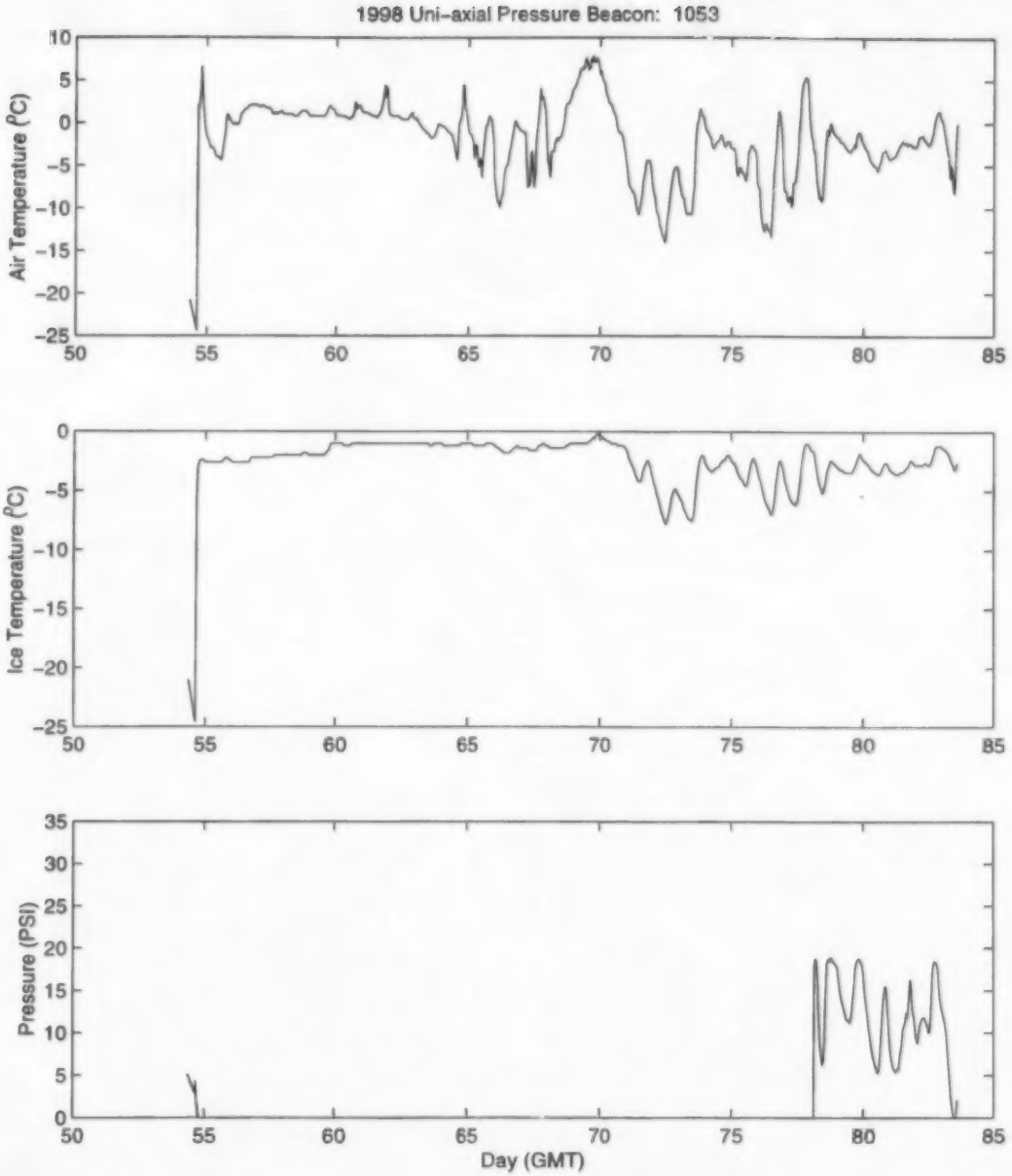


**Figure 14.2.2 1998 data from uni-axial pressure beacon 1053**

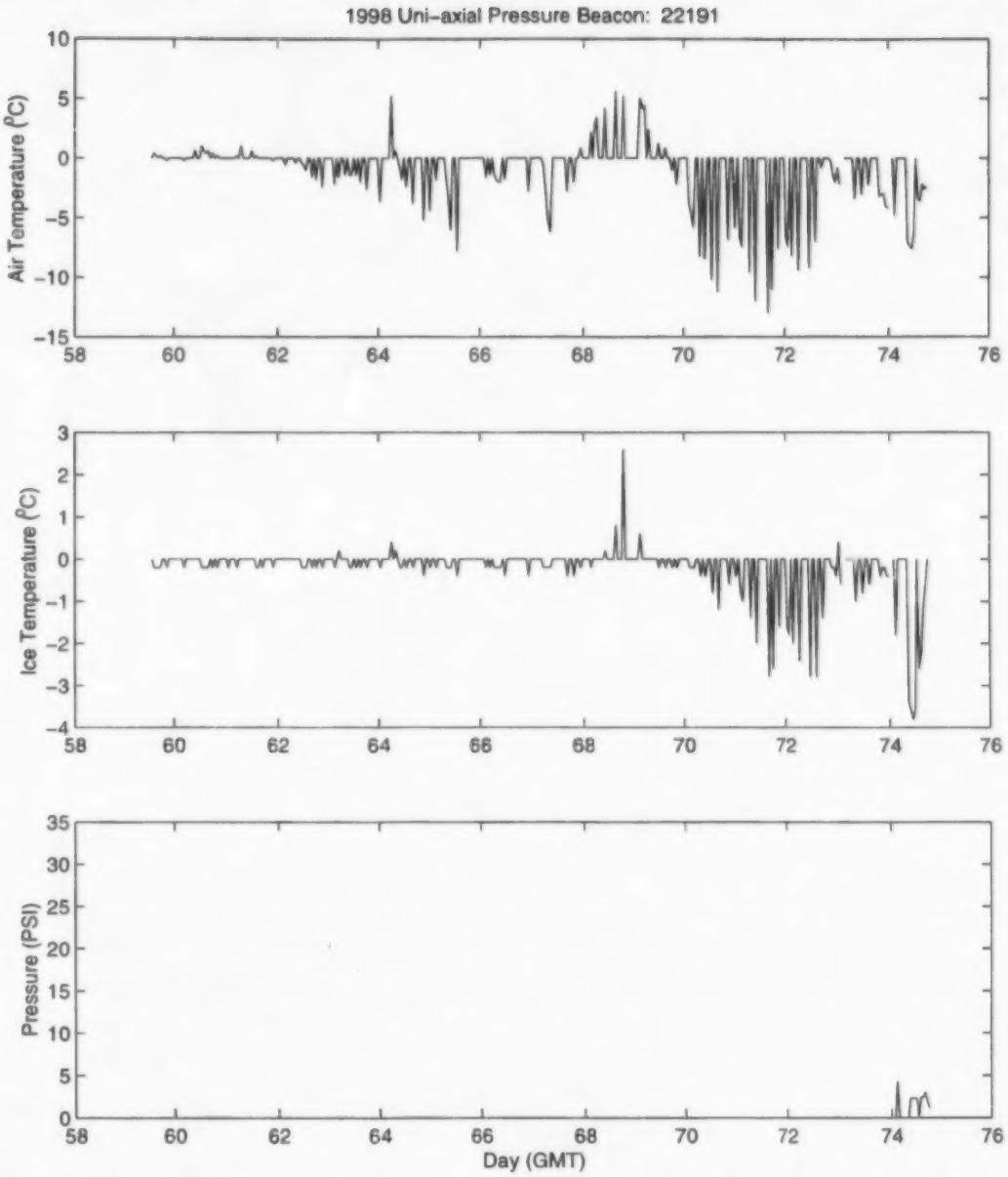


**Figure 14.2.3 1998 data from uni-axial pressure beacon 22191**

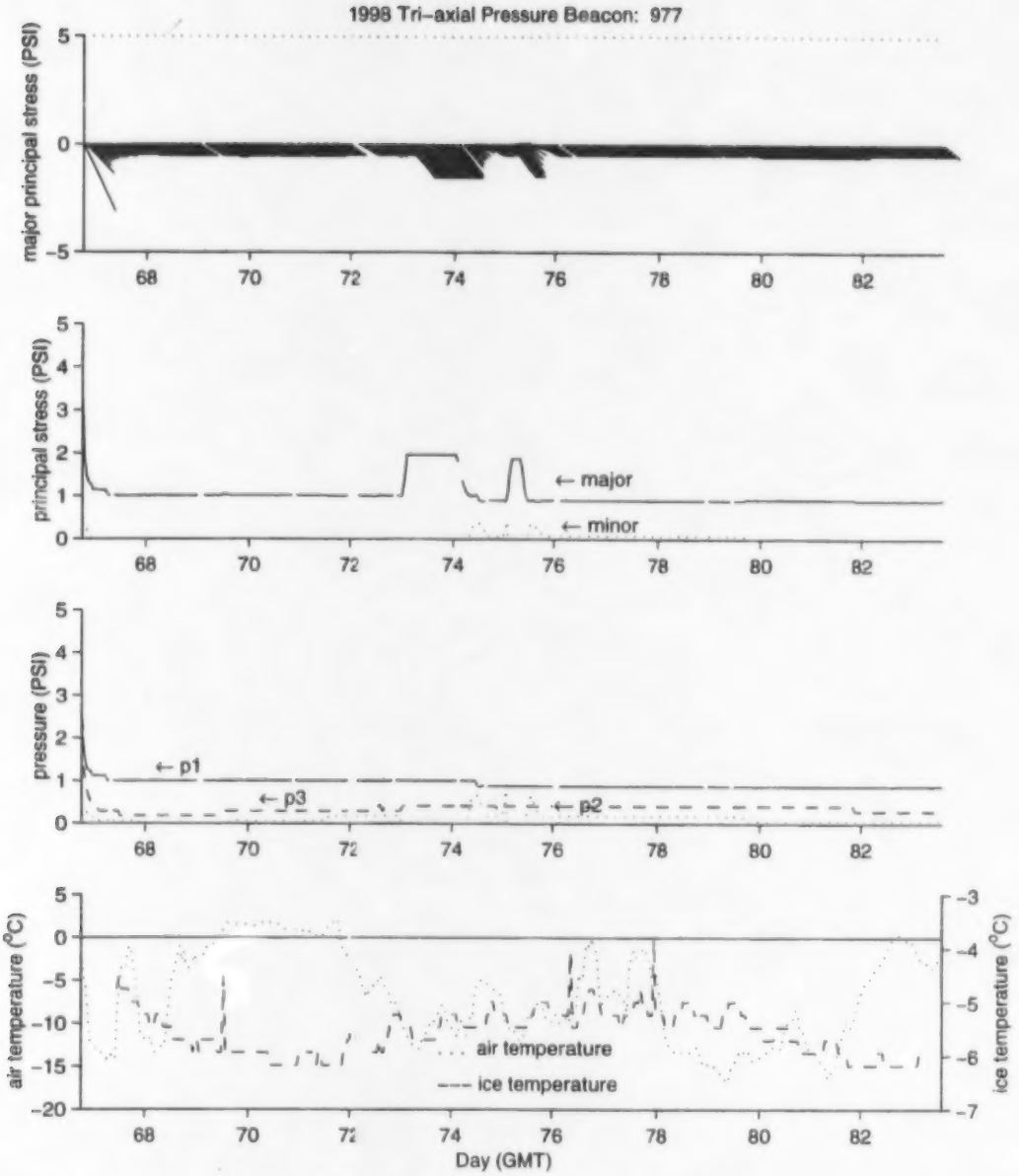


**Figure 14.2.4 1998 data from tri-axial pressure beacon 977**

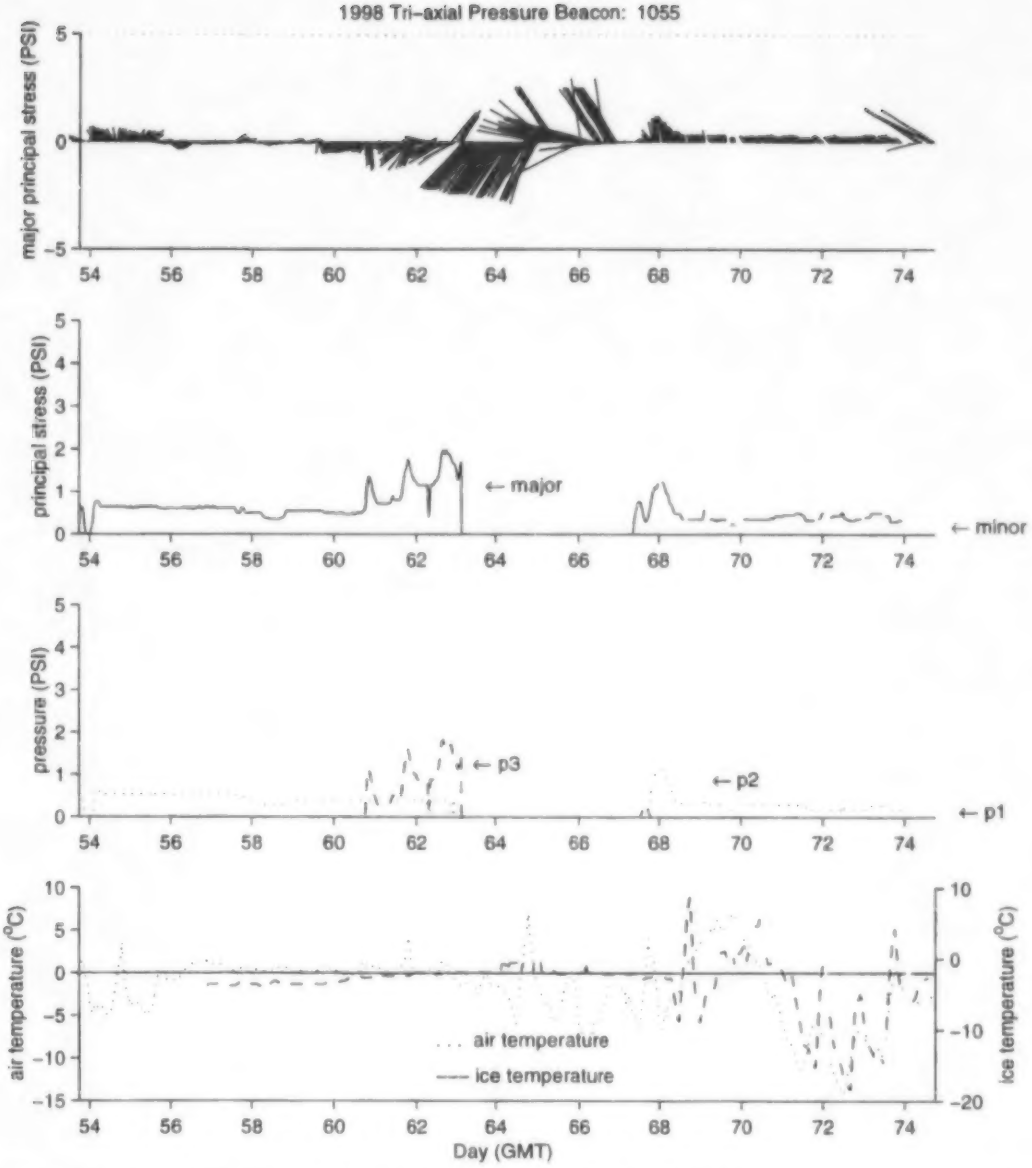


**Figure 14.2.5 1998 data from tri-axial pressure beacon 1055**

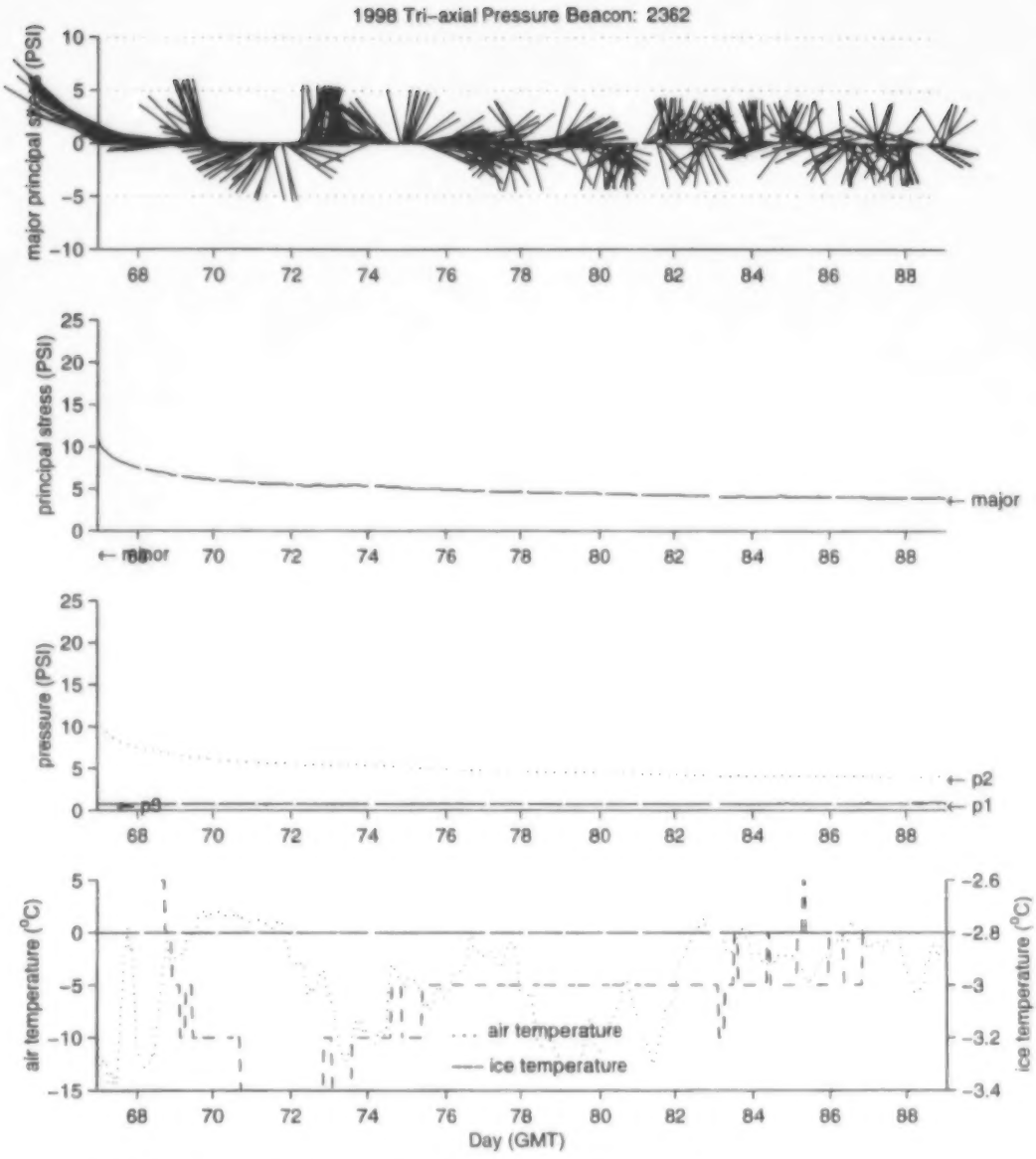


**Figure 14.2.6 1998 data from tri-axial pressure beacon 2362**

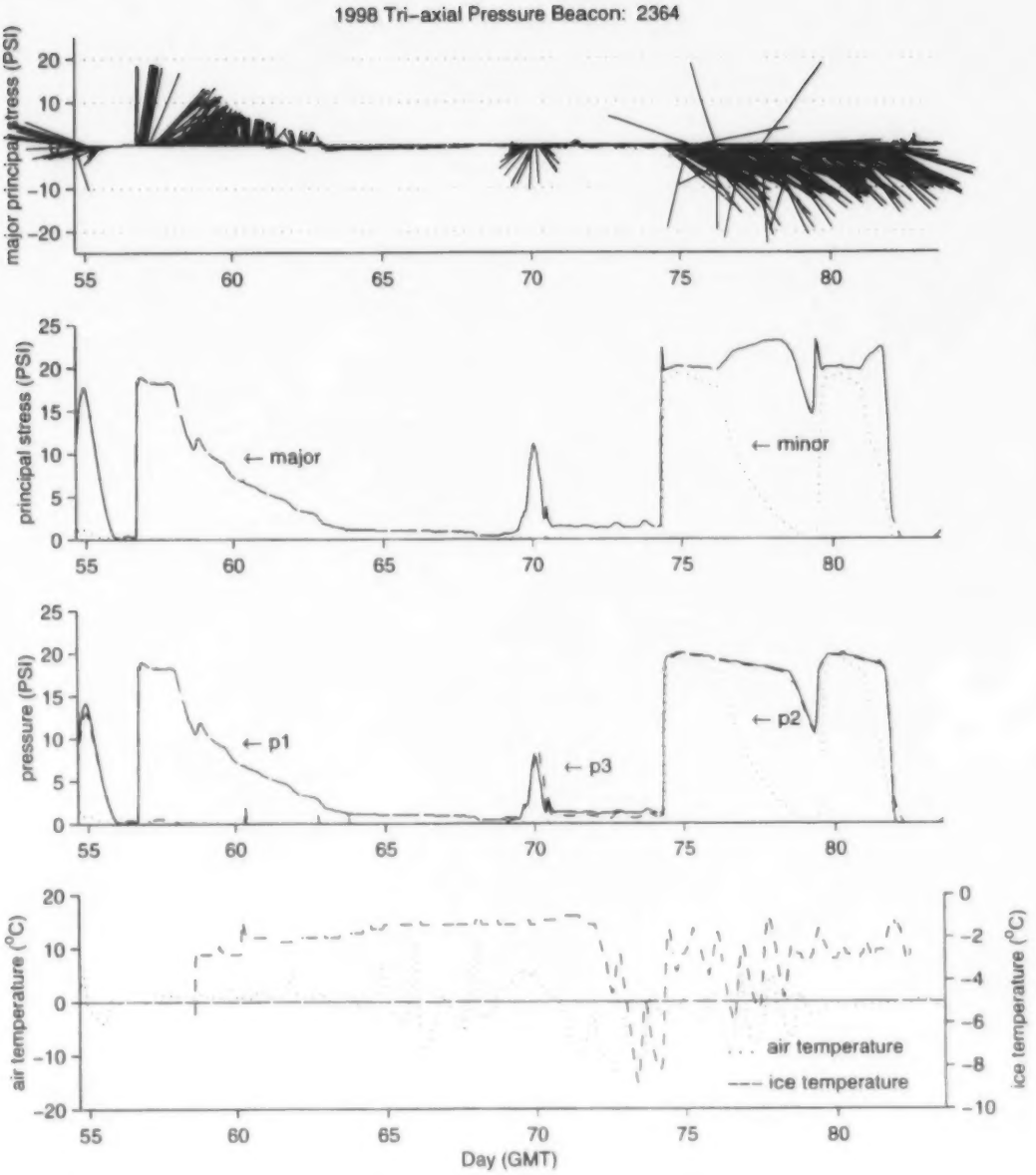


**Figure 14.2.7 1998 data from tri-axial pressure beacon 2364**

## 14.3 1998 Temperature staff data

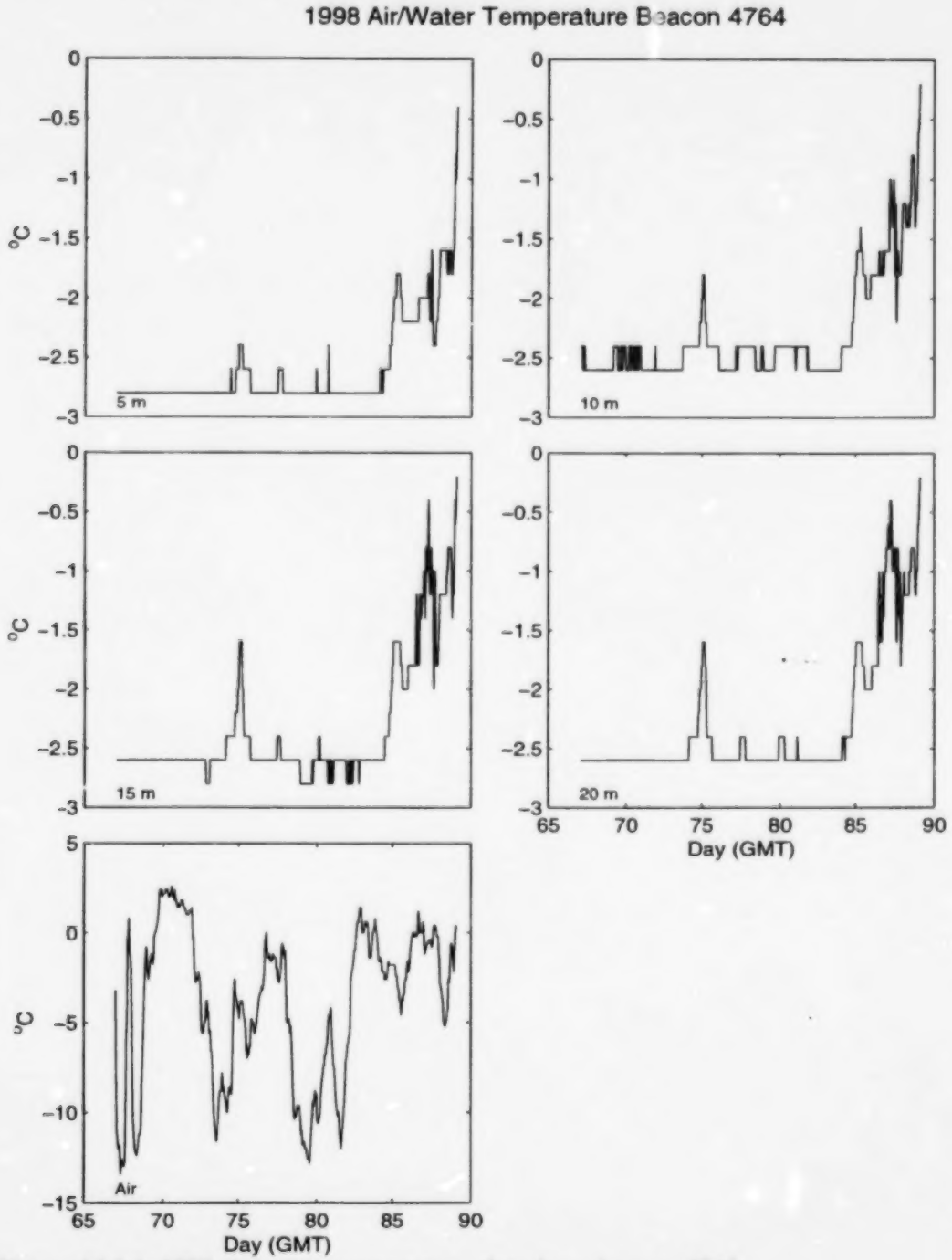


**Figure 14.3.1 1998 air/water temperature data from beacon 4764**

## 14.4 1998 GPS data

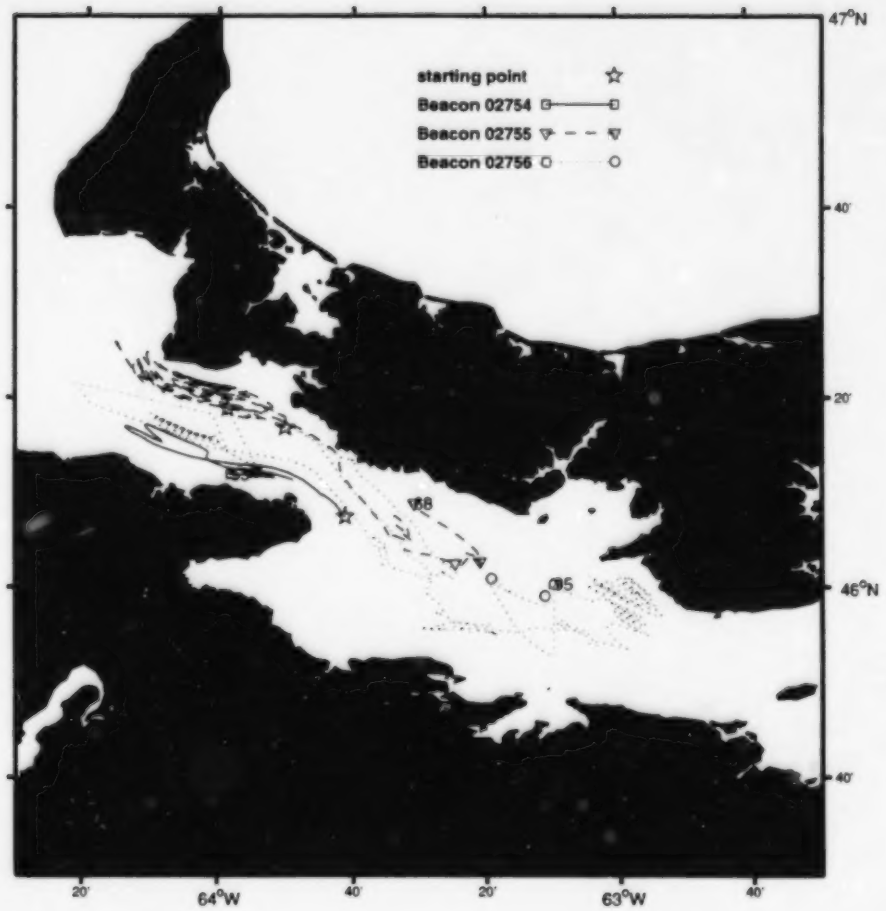


**Figure 14.4.1 1998 GPS beacon tracks for hourly data from beacons 2754, 2755, and 2756 in the Gulf of St. Lawrence**

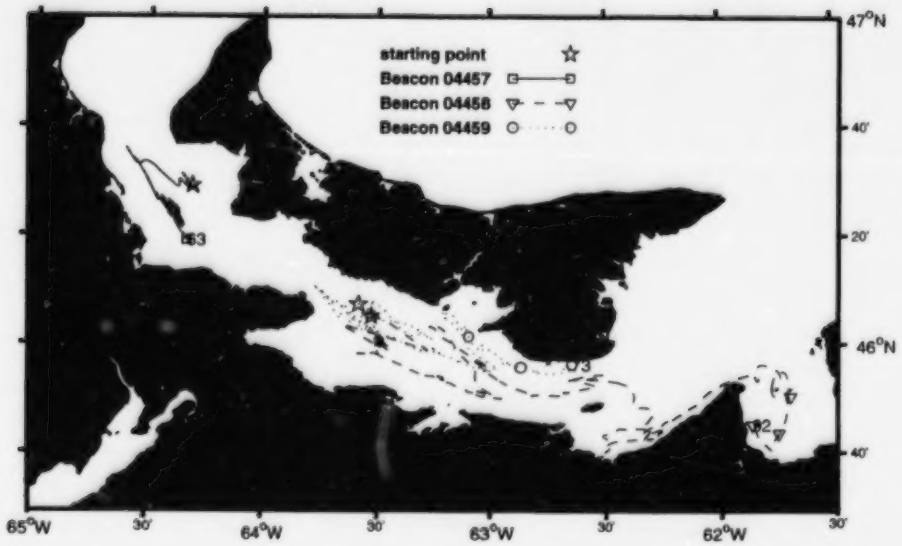


**Figure 14.4.2 1998 GPS beacon tracks for hourly data from beacons 4457, 4458, and 4459 in the Gulf of St. Lawrence**

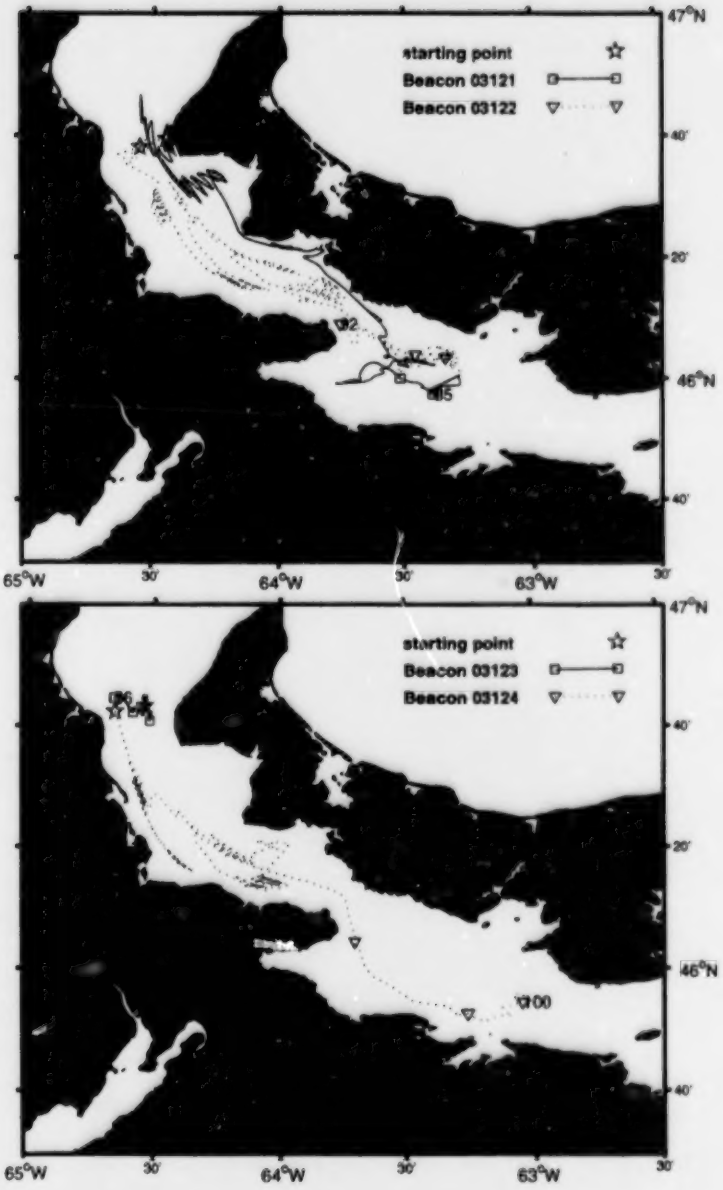


**Figure 14.4.3 1998 GPS beacon tracks for hourly data from beacons 3121, 3122, 3123, and 3124 in the Gulf of St. Lawrence**

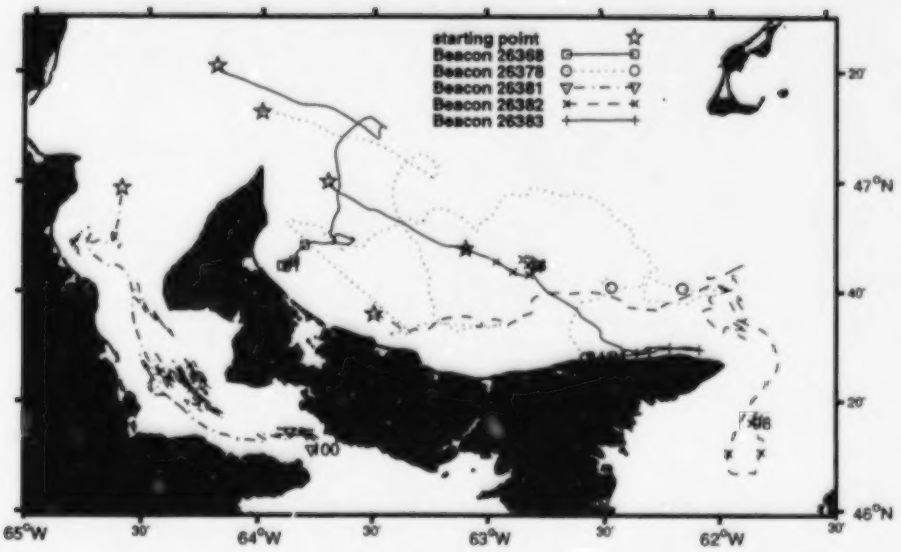


**Figure 14.4.4 1998 GPS beacon tracks for hourly data from beacons 26366, 26378, 26381, 26382, and 26383 in the Gulf of St. Lawrence**

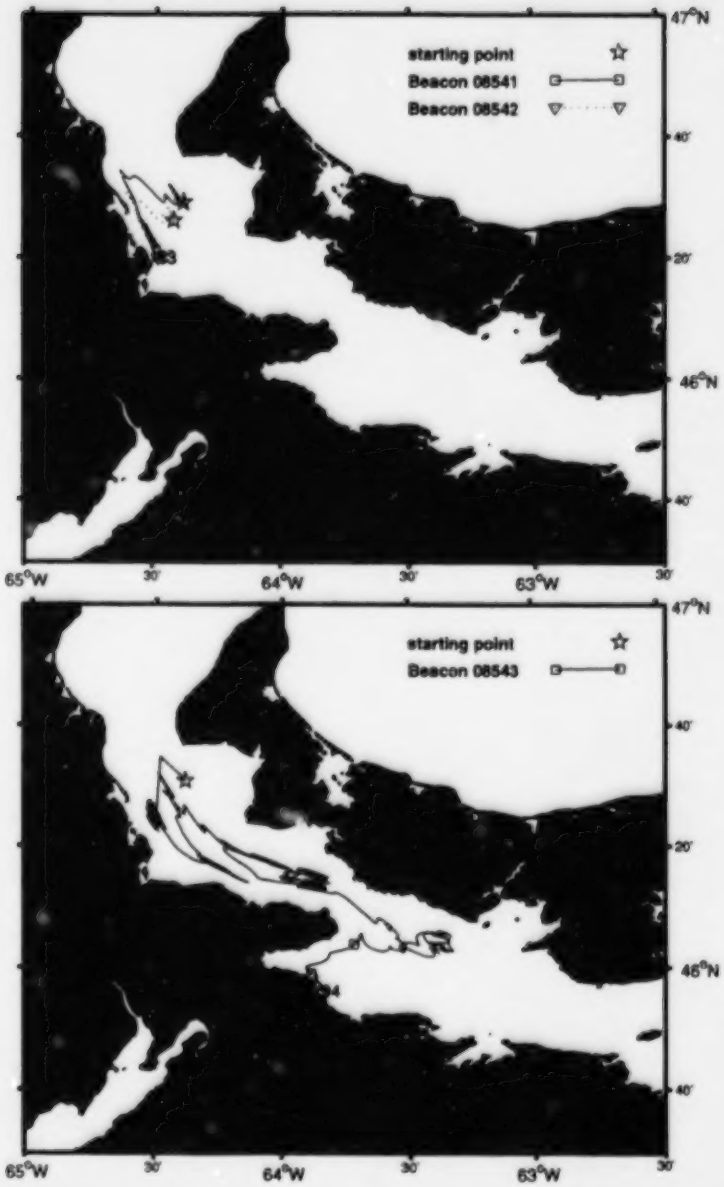


**Figure 14.4.5 1998 GPS beacon tracks for hourly data from beacons 8541, 8542, and 8543 in the Gulf of St. Lawrence**

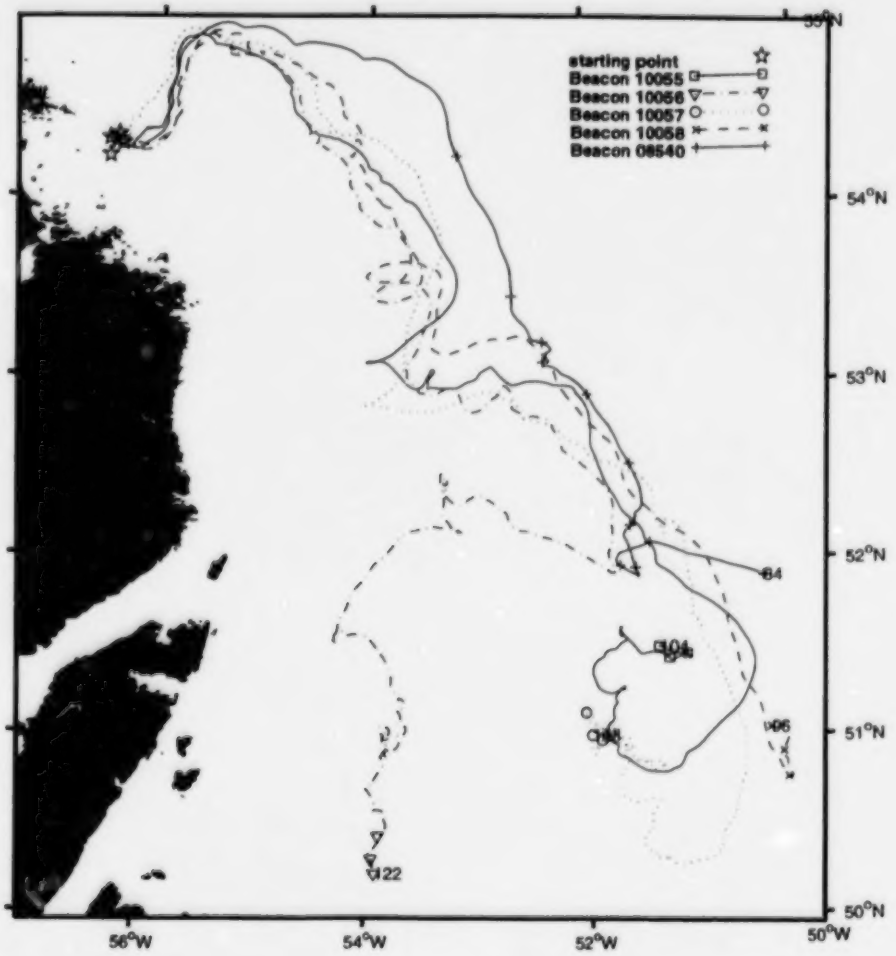


**Figure 14.4.6 1998 GPS beacon tracks for hourly data from beacons 10055, 10056, 10057, 10058, and 8540 off Labrador**

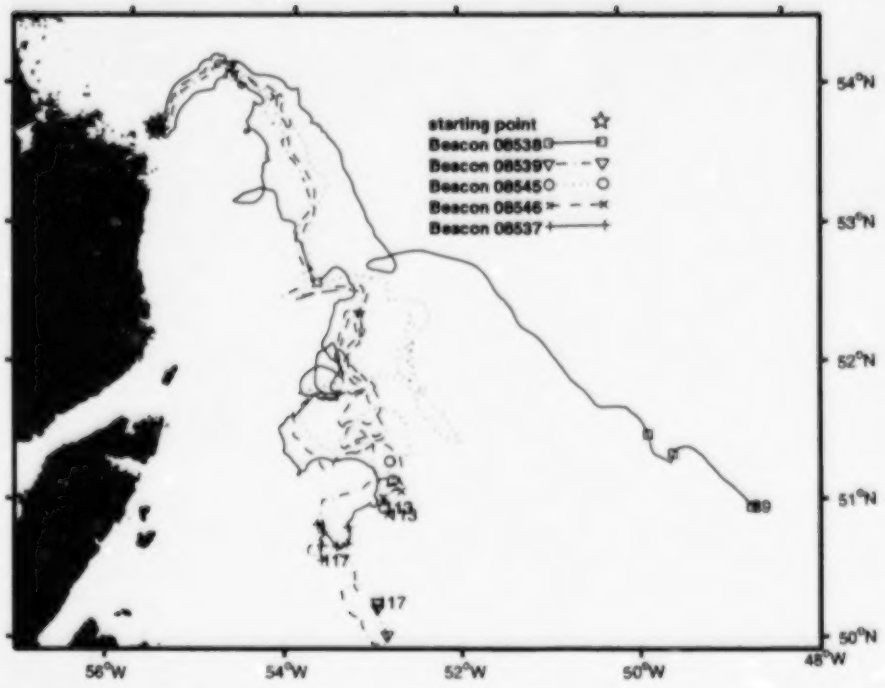


**Figure 14.4.7 1998 GPS beacon tracks for hourly data from beacons 8538, 8539, 8540, 8546, and 8537 off Labrador**

## 14.5 1998 CTD data

### 14.5.1 1998 station 4

FILE SPECIFICATION = CTD_98903_4P_1_DN.ODF
CRUISE_NUMBER = 98903
CRUISE_NAME = HAMILTON BANK CAST 01
CRUISE_DESCRIPTION = LABRADOR 1998
START_DATE_TIME = 6-MAR-1998 19:06:20.00
END DATE TIME = 6-MAR-1998 19:10:31.75
INITIAL LATITUDE = 53.9729
INITIAL LONGITUDE = -55.7273
END_LATITUD E= 53.9729
END LONGITUDE = -55.7273
MIN DEPTH = 4.5
MAX DEPTH = 197.1
SAMPLING INTERVAL = 0.25000000
SOUNDING = 200.0
DEPTH_OFF_BOTTOM = 2.9

**Table 14.5.1.1 1998 CTD station 4, downcast data**

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 10 | -1.7855 | | -1.7856 | |
| 15 | -1.7860 | | -1.7862 | |
| 20 | -1.7856 | | -1.7858 | |
| 25 | -1.7841 | 32.8616 | -1.7844 | 26.4419 |
| 30 | -1.7835 | 32.8611 | -1.7840 | 26.4415 |
| 35 | -1.7838 | 32.8614 | -1.7843 | 26.4417 |
| 40 | -1.7836 | 32.8613 | -1.7842 | 26.4417 |
| 45 | -1.7835 | 32.8610 | -1.7842 | 26.4414 |
| 50 | -1.7837 | 32.8609 | -1.7845 | 26.4414 |
| 55 | -1.7836 | 32.8611 | -1.7845 | 26.4415 |
| 60 | -1.7835 | 32.8610 | -1.7844 | 26.4415 |
| 65 | -1.7832 | 32.8610 | -1.7843 | 26.4414 |
| 70 | -1.7831 | 32.8610 | -1.7842 | 26.4414 |
| 75 | -1.7832 | 32.8612 | -1.7844 | 26.4415 |
| 80 | -1.7833 | 32.8614 | -1.7846 | 26.4418 |
| 85 | -1.7833 | 32.8614 | -1.7847 | 26.4418 |
| 90 | -1.7834 | 32.8616 | -1.7849 | 26.4419 |
| 95 | -1.7844 | 32.8626 | -1.7860 | 26.4428 |
| 100 | -1.7850 | 32.8632 | -1.7866 | 26.4432 |
| 105 | -1.7850 | 32.8634 | -1.7867 | 26.4434 |
| 110 | -1.7851 | 32.8640 | -1.7869 | 26.4439 |
| 115 | -1.7864 | 32.8664 | -1.7883 | 26.4459 |
| 120 | -1.7878 | 32.8681 | -1.7898 | 26.4473 |
| 125 | -1.7879 | 32.8687 | -1.7901 | 26.4478 |
| 130 | -1.7880 | 32.8690 | -1.7902 | 26.4480 |
| 135 | -1.7884 | 32.8694 | -1.7907 | 26.4484 |
| 140 | -1.7883 | 32.8693 | -1.7907 | 26.4484 |
| 145 | -1.7882 | 32.8696 | -1.7908 | 26.4485 |
| 150 | -1.7887 | 32.8703 | -1.7913 | 26.4491 |
| 155 | -1.7887 | 32.8707 | -1.7914 | 26.4494 |

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 160 | -1.7888 | 32.8711 | -1.7916 | 26.4498 |
| 165 | -1.7885 | 32.8715 | -1.7914 | 26.4501 |
| 170 | -1.7884 | 32.8723 | -1.7913 | 26.4508 |
| 175 | -1.7879 | 32.8727 | -1.7910 | 26.4511 |
| 180 | -1.7859 | 32.8733 | -1.7891 | 26.4515 |
| 185 | -1.7844 | 32.8733 | -1.7876 | 26.4515 |
| 190 | -1.7843 | 32.8743 | -1.7877 | 26.4523 |
| 195 | -1.7674 | 32.8755 | -1.7710 | 26.4529 |

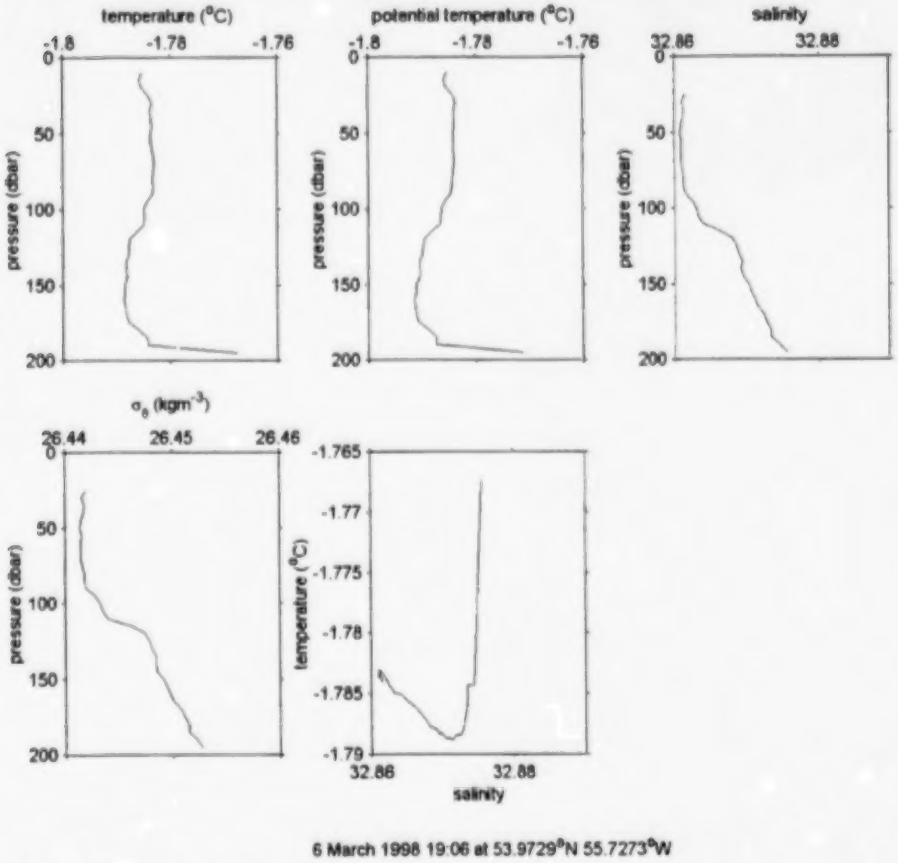


**Figure 14.5.1.1 1998 station 4 CTD and T-S profiles, downcast**

FILE SPECIFICATION = CTD_98903_4P_1_UP.ODF
CRUISE_NUMBER = 98903
CRUISE_NAME = HAMILTON BANK
CRUISE_DESCRIPTION = LABRADOR 1998
START_DATE_TIME = 6-MAR-1998 19:10:55.75
END DATE TIME = 6-MAR-1998 19:18:53.50
INITIAL LATITUDE = 53.9729
INITIAL LONGITUDE = -55.7273
END LATITUDE = 53.9729
END LONGITUDE = -55.7273
MIN DEPTH = 1.5,
MAX DEPTH = 197.2
SAMPLING INTERVAL = 0.25000000
SOUNDING = 200.0
DEPTH_OFF_BOTTOM = 2.8

**Table 14.5.1.2 1998 CTD station 4, upcast data**

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 5 | -1.7880 | | -1.7881 | |
| 10 | -1.7867 | 32.8647 | -1.7868 | 26.4445 |
| 15 | -1.7864 | 32.8644 | -1.7866 | 26.4443 |
| 20 | -1.7858 | 32.8639 | -1.7861 | 26.4438 |
| 25 | -1.7857 | 32.8638 | -1.7860 | 26.4437 |
| 30 | -1.7854 | 32.8636 | -1.7858 | 26.4435 |
| 35 | -1.7852 | 32.8636 | -1.7857 | 26.4436 |
| 40 | -1.7850 | 32.8636 | -1.7856 | 26.4436 |
| 45 | -1.7848 | 32.8636 | -1.7855 | 26.4436 |
| 50 | -1.7846 | 32.8634 | -1.7854 | 26.4435 |
| 55 | -1.7843 | 32.8632 | -1.7852 | 26.4432 |
| 60 | -1.7840 | 32.8629 | -1.7850 | 26.4430 |
| 65 | -1.7839 | 32.8631 | -1.7850 | 26.4431 |
| 70 | -1.7839 | 32.8631 | -1.7851 | 26.4431 |
| 75 | -1.7838 | 32.8630 | -1.7850 | 26.4431 |
| 80 | -1.7836 | 32.8629 | -1.7849 | 26.4430 |
| 85 | -1.7836 | 32.8631 | -1.7850 | 26.4431 |
| 90 | -1.7833 | 32.8629 | -1.7848 | 26.4430 |
| 95 | -1.7834 | 32.8631 | -1.7850 | 26.4431 |
| 100 | -1.7833 | 32.8629 | -1.7850 | 26.4430 |
| 105 | -1.7836 | 32.8632 | -1.7854 | 26.4432 |
| 110 | -1.7852 | 32.8654 | -1.7871 | 26.4450 |
| 115 | -1.7871 | 32.8680 | -1.7890 | 26.4472 |
| 120 | -1.7883 | 32.8695 | -1.7903 | 26.4485 |
| 125 | -1.7888 | 32.8704 | -1.7910 | 26.4492 |
| 130 | -1.7887 | 32.8704 | -1.7909 | 26.4492 |
| 135 | -1.7888 | 32.8706 | -1.7911 | 26.4494 |
| 140 | -1.7887 | 32.8707 | -1.7911 | 26.4495 |
| 145 | -1.7888 | 32.8710 | -1.7913 | 26.4497 |
| 150 | -1.7890 | 32.8712 | -1.7916 | 26.4499 |
| 155 | -1.7889 | 32.8713 | -1.7916 | 26.4500 |
| 160 | -1.7890 | 32.8721 | -1.7918 | 26.4506 |
| 165 | -1.7890 | 32.8730 | -1.7919 | 26.4513 |
| 170 | -1.7886 | 32.8742 | -1.7916 | 26.4523 |
| 175 | -1.7872 | 32.8748 | -1.7903 | 26.4527 |

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 180 | -1.7856 | 32.8749 | -1.7888 | 26.4529 |
| 185 | -1.7849 | 32.8754 | -1.7881 | 26.4532 |
| 190 | -1.7830 | 32.8800 | -1.7864 | 26.4569 |
| 195 | -1.7599 | 32.9017 | -1.7634 | 26.4740 |

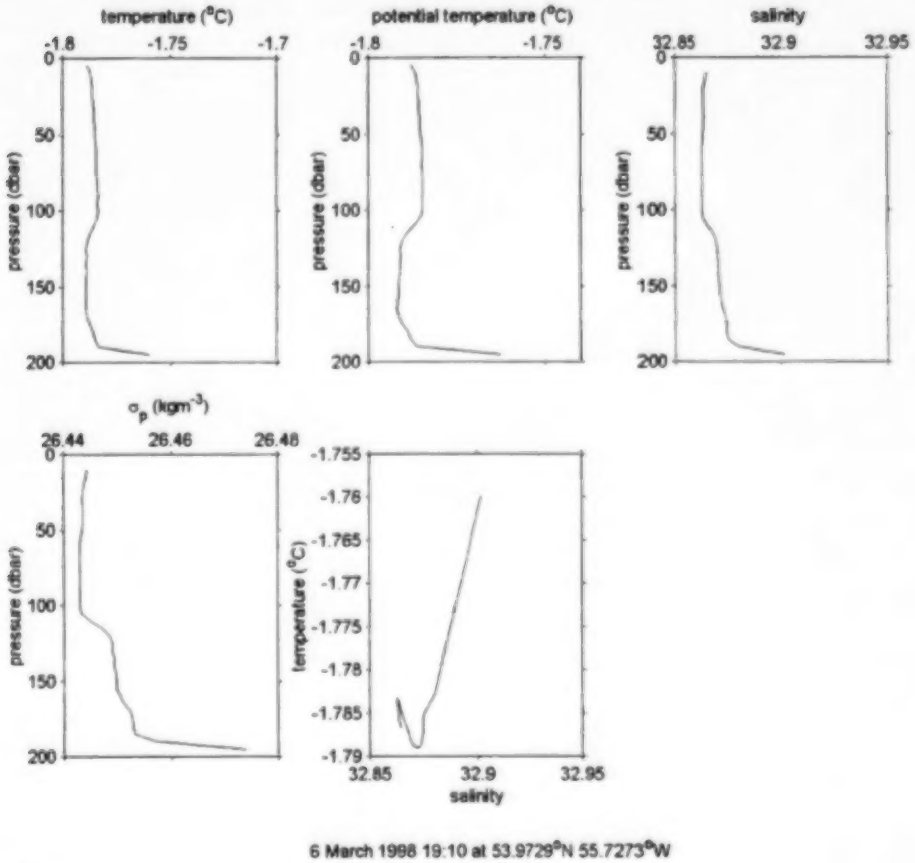


**Figure 14.5.1.2 1998 station 4 CTD and T-S profiles, upcast**

### 14.5.2 1998 station 5

FILE SPECIFICATION = CTD_98903_5P_1_DN.ODF
CRUISE_NUMBER = 98903
CRUISE_NAME= HAMILTON BANK CAST 02
CRUISE_DESCRIPTION = LABRADOR 1998'
START_DATE_TIME = 6-MAR-1998 19:41:34.00
END DATE TIME = 6-MAR-1998 19:46:01.00
INITIAL LATITUDE = 53.9003
INITIAL LONGITUDE = -55.8645
END LATITUDE = 53.9003
END LONGITUDE = -55.8645
MIN DEPTH = 2.8,
MAX DEPTH = 155.5
SAMPLING INTERVAL = 0.25000000
SOUNDING = 180.0
DEPTH_OFF_BOTTOM = 23.4
EVENT COMMENTS = 5-MAY-1998 14:22:47 Close to the Ice Melt Beacon 2753 deployment
EVENT COMMENTS = 6-MAY-1998 09:53:09 PRESSURE OFFSET OF 0.526 ADDED
EVENT COMMENTS = 7-MAY-1998 13:55:19 5p_up was dropped the data was bad

**Table 14.5.2.1 1998 CTD station 5, downcast data**

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 5 | -1.7982 | | -1.7983 | |
| 10 | -1.7988 | | -1.7989 | |
| 15 | -1.7983 | | -1.7985 | |
| 20 | -1.7983 | | -1.7985 | |
| 25 | -1.7976 | | -1.7980 | |
| 30 | -1.7970 | | -1.7975 | |
| 35 | -1.7967 | 32.8467 | -1.7972 | 26.4301 |
| 40 | -1.7967 | 32.8469 | -1.7973 | 26.4303 |
| 45 | -1.7970 | 32.8472 | -1.7976 | 26.4305 |
| 50 | -1.7971 | 32.8474 | -1.7979 | 26.4307 |
| 55 | -1.7971 | 32.8475 | -1.7980 | 26.4308 |
| 60 | -1.7968 | 32.8475 | -1.7977 | 26.4307 |
| 65 | -1.7963 | 32.8477 | -1.7974 | 26.4309 |
| 70 | -1.7963 | 32.8479 | -1.7975 | 26.4310 |
| 75 | -1.7957 | 32.8482 | -1.7969 | 26.4313 |
| 80 | -1.7946 | 32.8487 | -1.7959 | 26.4317 |
| 85 | -1.7943 | 32.8488 | -1.7957 | 26.4317 |
| 90 | -1.7940 | 32.8490 | -1.7955 | 26.4319 |
| 95 | -1.7928 | 32.8497 | -1.7943 | 26.4325 |
| 100 | -1.7921 | 32.8504 | -1.7937 | 26.4330 |
| 105 | -1.7918 | 32.8508 | -1.7936 | 26.4333 |
| 110 | -1.7913 | 32.8513 | -1.7932 | 26.4337 |
| 115 | -1.7910 | 32.8515 | -1.7929 | 26.4339 |
| 120 | -1.7908 | 32.8519 | -1.7928 | 26.4342 |
| 125 | -1.7905 | 32.8522 | -1.7926 | 26.4344 |
| 130 | -1.7896 | 32.8532 | -1.7918 | 26.4353 |
| 135 | -1.7891 | 32.8537 | -1.7914 | 26.4357 |
| 140 | -1.7887 | 32.8543 | -1.7911 | 26.4361 |
| 145 | -1.7879 | 32.8554 | -1.7904 | 26.4370 |
| 150 | -1.7875 | 32.8559 | -1.7901 | 26.4374 |

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 155 | -1.7853 | 32.8579 | -1.7880 | 26.4390 |

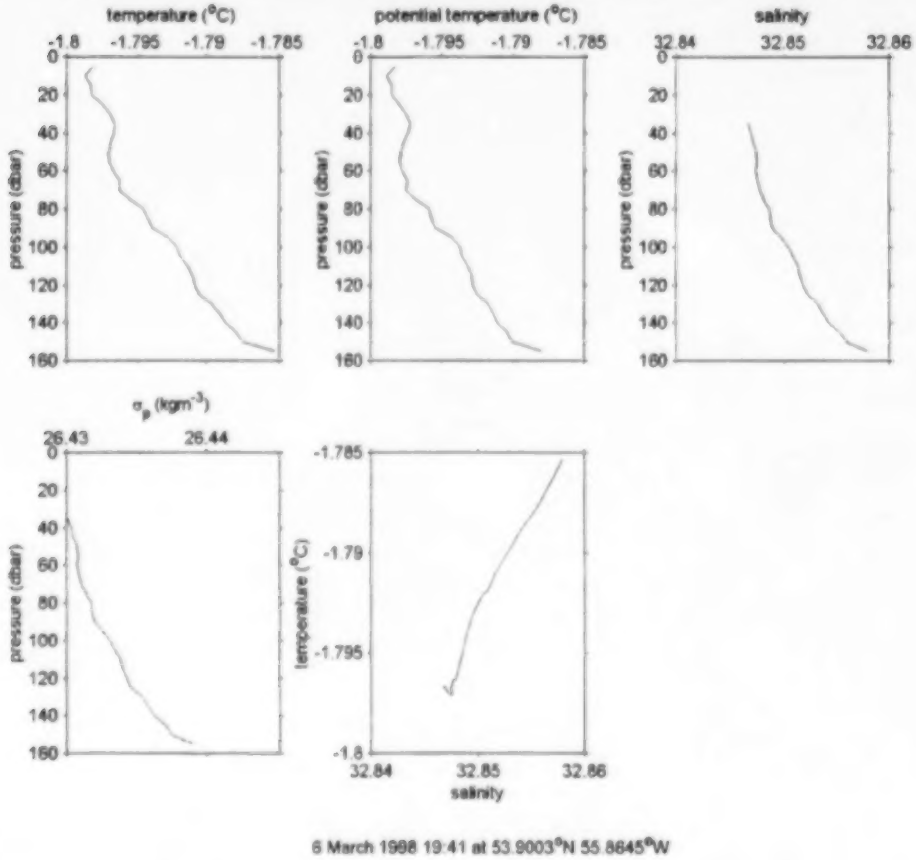


**Figure 14.5.2.1 1998 station 5 CTD and T-S profiles, downcast**

### 14.5.3 1998 station 6

FILE SPECIFICATION = CTD_98903_6P_1_UP.ODF
CRUISE_NUMBER = 98903
CRUISE_NAME = HAMILTON BANK CAST 03
CRUISE_DESCRIPTION = LABRADOR 1998
START_DATE_TIME = 6-MAR-1998 20:31:59.25
END DATE TIME = 6-MAR-1998 20:36:30.25
INITIAL LATITUDE = 53.8455
INITIAL LONGITUDE = -56.0555
END LATITUDE = 53.8455
END LONGITUDE = -56.0555
MIN DEPTH = 1.4
MAX DEPTH = 80.5
SAMPLING INTERVAL = 0.25000000
SOUNDING = 80.0
DEPTH_OFF_BOTTOM = -2.3
EVENT COMMENTS = 6-MAY-1998 09:56:52 PRESSURE OFFSET OF 1.284 ADDED
EVENT COMMENTS = 7-MAY-1998 13:56:20 6p_dn was dropped the data were bad

**Table 14.5.3.1 1998 CTD station 6, upcast data**

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 5 | -1.7954 | 32.7127 | -1.7955 | 26.3211 |
| 10 | -1.7955 | 32.7260 | -1.7956 | 26.3320 |
| 15 | -1.7956 | 32.7300 | -1.7958 | 26.3352 |
| 20 | -1.7957 | 32.7421 | -1.7960 | 26.3450 |
| 25 | -1.7959 | 32.7640 | -1.7962 | 26.3628 |
| 30 | -1.7957 | 32.7712 | -1.7961 | 26.3687 |
| 35 | -1.7945 | 32.7941 | -1.7950 | 26.3873 |
| 40 | -1.7937 | 32.8318 | -1.7943 | 26.4179 |
| 45 | -1.7927 | 32.8417 | -1.7934 | 26.4260 |
| 50 | -1.7920 | 32.8423 | -1.7928 | 26.4264 |
| 55 | -1.7919 | 32.8427 | -1.7928 | 26.4267 |
| 60 | -1.7918 | | -1.7927 | |
| 65 | -1.7917 | | -1.7927 | |
| 70 | -1.7914 | | -1.7925 | |
| 75 | -1.7912 | | -1.7924 | |
| 80 | -1.7909 | | -1.7922 | |

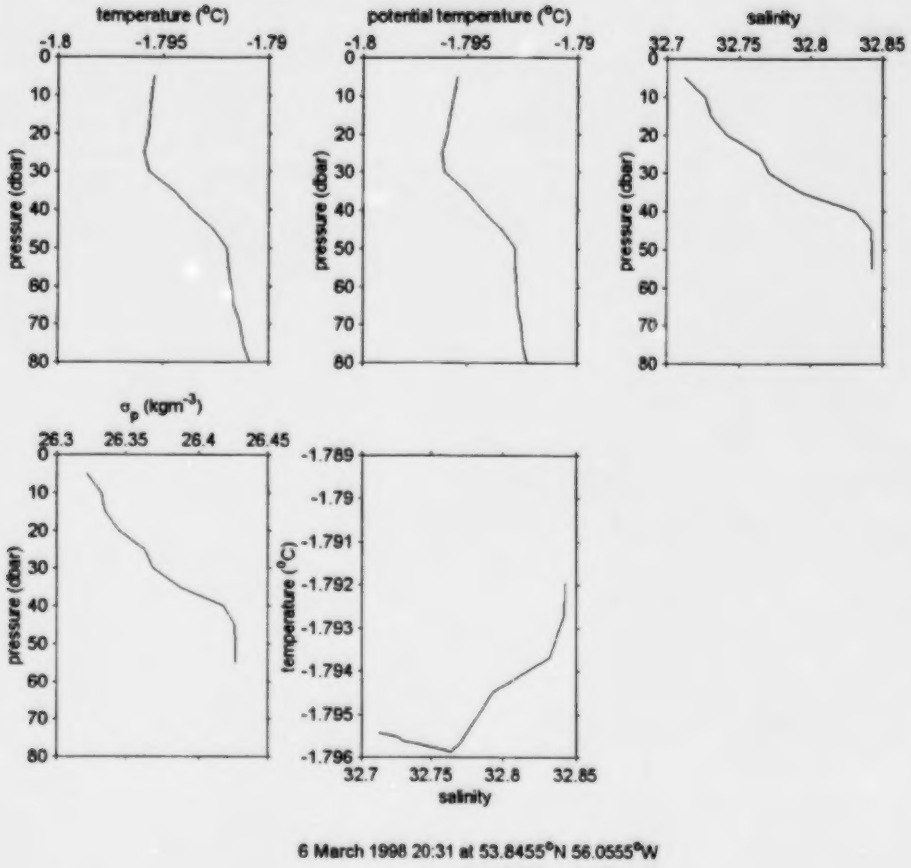


**Figure 14.5.3.1 1998 station 6 CTD and T-S profiles, upcast**

### 14.5.4 1998 station 7

FILE SPECIFICATION = CTD_98903_7P_1_DN.ODF
CRUISE_NUMBER = 98903
CRUISE_NAME = HAMILTON BANK CAST 04
CRUISE_DESCRIPTION = LABRADOR 1998
START_DATE_TIME = 6-MAR-1998 20:56:27.00
END DATE TIME = 6-MAR-1998 20:58:39.25
INITIAL LATITUDE = 53.8073
INITIAL LONGITUDE = -56.1925
END LATITUDE = 53.8073
END LONGITUDE = -56.1925
MIN DEPTH = 3.7
MAX DEPTH = 65.4,
SAMPLING INTERVAL = 0.25000000
SOUNDING = 70.0
DEPTH_OFF_BOTTOM = 4.6
EVENT COMMENTS = 6-MAY-1998 09:58:41 PRESSURE OFFSET OF 1.473 ADDED

**Table 14.5.4.1 1998 CTD station 7, downcast data**

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 5 | -1.7516 | | -1.7517 | |
| 10 | -1.7636 | | -1.7637 | |
| 15 | -1.7636 | | -1.7638 | |
| 20 | -1.7636 | 32.1600 | -1.7638 | 25.8712 |
| 25 | -1.7625 | 32.2170 | -1.7628 | 25.9175 |
| 30 | -1.7671 | 32.4310 | -1.7676 | 26.0916 |
| 35 | -1.7810 | 32.6055 | -1.7816 | 26.2337 |
| 40 | -1.7903 | 32.7517 | -1.7909 | 26.3527 |
| 45 | -1.7943 | 32.8029 | -1.7950 | 26.3944 |
| 50 | -1.7928 | 32.8267 | -1.7935 | 26.4138 |
| 55 | -1.7899 | 32.8411 | -1.7908 | 26.4254 |
| 60 | -1.7897 | 32.8418 | -1.7907 | 26.4260 |
| 65 | -1.7895 | 32.8419 | -1.7906 | 26.4260 |

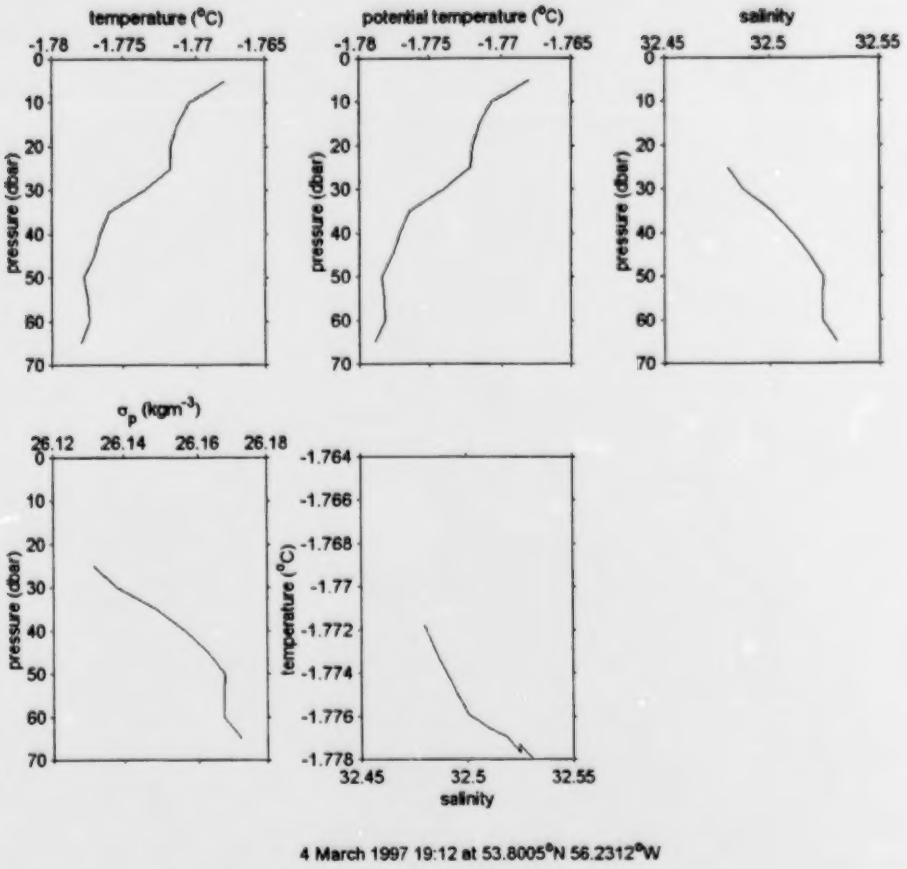


**Figure 14.5.4.1 1998 station 7 CTD and T-S profiles, downcast**

FILE SPECIFICATION = CTD_98903_7P_1_UP.ODF
CRUISE_NUMBER = 98903
CRUISE_NAME = HAMILTON BANK CAST 04
CRUISE_DESCRIPTION = LABRADOR 1998'
START_DATE_TIME = 6-MAR-1998 20:58:43.25
END DATE TIME = 6-MAR-1998 21:03:12.75
INITIAL LATITUDE = 53.8073
INITIAL LONGITUDE = -56.1925
END LATITUDE = 53.8073
END LONGITUDE= -56.1925
MIN DEPTH = 0.4
MAX DEPTH = 65.4
SAMPLING INTERVAL = 0.25000000
SOUNDING = 70.0
DEPTH_OFF_BOTTOM = 4.6,
EVENT COMMENTS = 6-MAY-1998 09:58:41 PRESSURE OFFSET OF 1.473 ADDED

**Table 14.5.4.2 1998 CTD station 7, upcast data**

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 5 | -1.7634 | 32.1567 | -1.7634 | 25.8685 |
| 10 | -1.7631 | 32.1560 | -1.7632 | 25.8680 |
| 15 | -1.7633 | 32.1561 | -1.7635 | 25.8680 |
| 20 | -1.7634 | 32.1579 | -1.7636 | 25.8695 |
| 25 | -1.7626 | 32.2389 | -1.7630 | 25.9353 |
| 30 | -1.7661 | 32.4606 | -1.7665 | 26.1155 |
| 35 | -1.7821 | 32.6421 | -1.7826 | 26.2635 |
| 40 | -1.7908 | 32.7722 | -1.7914 | 26.3694 |
| 45 | -1.7942 | 32.8125 | -1.7949 | 26.4022 |
| 50 | -1.7916 | 32.8403 | -1.7923 | 26.4247 |
| 55 | -1.7893 | 32.8437 | -1.7901 | 26.4275 |
| 60 | -1.7893 | 32.8438 | -1.7902 | 26.4276 |
| 65 | -1.7885 | 32.8435 | -1.7895 | 26.4273 |

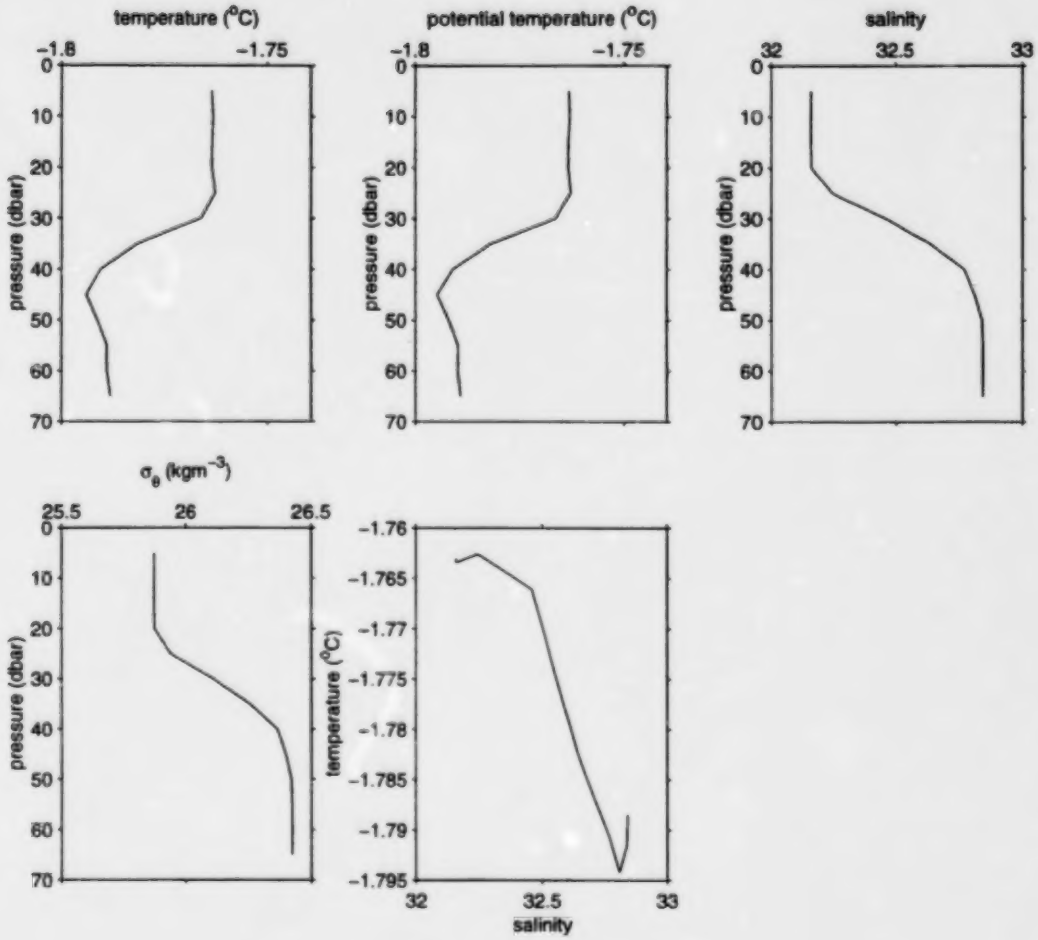


**Figure 14.5.4.2 1998 station 7 CTD and T-S profiles, upcast**

### 14.5.5 1998 beacon 2374 station

FILE SPECIFICATION = CTD_98903_ICEBEACON2374_1_DN.ODF
CRUISE_NUMBER = 98903
CRUISE_NAME = HAMILTON BANK CAST 06
CRUISE_DESCRIPTION = LABRADOR 1998
START_DATE_TIME = 7-MAR-1998 14:38:29.00
END DATE TIME = 7-MAR-1998 14:45:10.75
INITIAL LATITUDE = 54.1527
INITIAL LONGITUDE = -56.0417
END LATITUDE = 54.1527
END LONGITUDE = -56.0417
MIN DEPTH = 3.2
MAX DEPTH = 197.3
SAMPLING INTERVAL = 0.25000000
SOUNDING = 200.0
DEPTH_OFF_BOTTOM = 2.7
EVENT COMMENTS = 6-MAY-1998 10:01:13 PRESSURE OFFSET OF 0.431 ADDED

**Table 14.5.5.1 1998 CTD station at beacon 2374, downcast data**

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 5 | -1.7951 | | -1.7952 | |
| 10 | -1.7962 | | -1.7963 | |
| 15 | -1.7962 | | -1.7964 | |
| 20 | -1.7960 | 32.8396 | -1.7963 | 26.4243 |
| 25 | -1.7957 | 32.8386 | -1.7961 | 26.4234 |
| 30 | -1.7957 | 32.8383 | -1.7962 | 26.4232 |
| 35 | -1.7955 | 32.8380 | -1.7960 | 26.4230 |
| 40 | -1.7954 | 32.8379 | -1.7960 | 26.4229 |
| 45 | -1.7953 | 32.8377 | -1.7960 | 26.4227 |
| 50 | -1.7950 | 32.8373 | -1.7958 | 26.4224 |
| 55 | -1.7948 | 32.8372 | -1.7957 | 26.4223 |
| 60 | -1.7947 | 32.8371 | -1.7956 | 26.4223 |
| 65 | -1.7943 | 32.8372 | -1.7954 | 26.4224 |
| 70 | -1.7941 | 32.8373 | -1.7953 | 26.4224 |
| 75 | -1.7941 | 32.8374 | -1.7953 | 26.4225 |
| 80 | -1.7940 | 32.8374 | -1.7953 | 26.4224 |
| 85 | -1.7943 | 32.8377 | -1.7957 | 26.4227 |
| 90 | -1.7942 | 32.8375 | -1.7957 | 26.4225 |
| 95 | -1.7938 | 32.8375 | -1.7954 | 26.4225 |
| 100 | -1.7940 | 32.8378 | -1.7956 | 26.4228 |
| 105 | -1.7936 | 32.8379 | -1.7954 | 26.4229 |
| 110 | -1.7933 | 32.8377 | -1.7952 | 26.4227 |
| 115 | -1.7933 | 32.8380 | -1.7952 | 26.4230 |
| 120 | -1.7924 | 32.8384 | -1.7944 | 26.4233 |
| 125 | -1.7888 | 32.8393 | -1.7910 | 26.4239 |
| 130 | -1.7866 | 32.8401 | -1.7888 | 26.4246 |
| 135 | -1.7862 | 32.8406 | -1.7885 | 26.4249 |
| 140 | -1.7894 | 32.8397 | -1.7918 | 26.4243 |
| 145 | -1.7859 | 32.8405 | -1.7884 | 26.4249 |
| 150 | -1.7832 | 32.8412 | -1.7858 | 26.4253 |
| 155 | -1.7735 | 32.8437 | -1.7762 | 26.4272 |
| 160 | -1.7623 | 32.8481 | -1.7651 | 26.4305 |

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 165 | -1.7518 | 32.8526 | -1.7547 | 26.4340 |
| 170 | -1.7276 | 32.8608 | -1.7306 | 26.4401 |
| 175 | -1.7016 | 32.8735 | -1.7048 | 26.4498 |
| 180 | -1.6791 | 32.8892 | -1.6825 | 26.4620 |
| 185 | -1.6355 | 32.9110 | -1.6390 | 26.4787 |
| 190 | -1.6248 | 32.9177 | -1.6285 | 26.4839 |
| 195 | -1.6078 | 32.9266 | -1.6116 | 26.4907 |

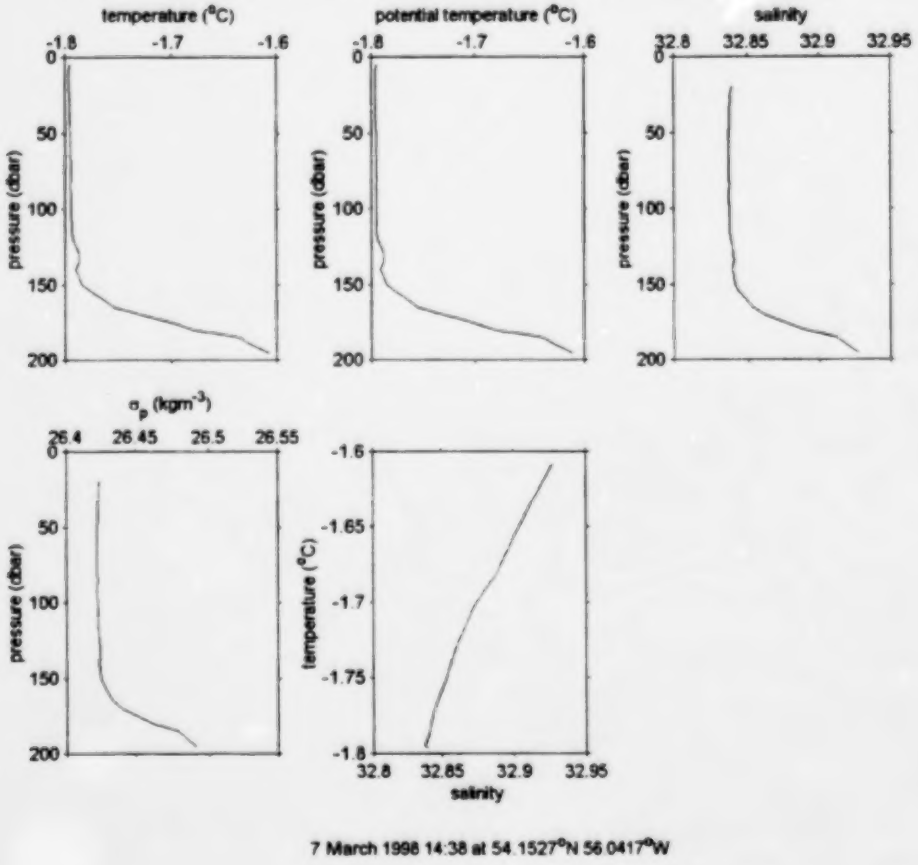


**Figure 14.5.5.1 1998 beacon 2374 station CTD and T-S profiles, downcast**

FILE SPECIFICATION = CTD_98903_ICEBEACON2374_1_UP.ODF
CRUISE_NUMBER = 98903
CRUISE_NAME = HAMILTON BANK CAST 06
CRUISE_DESCRIPTION = LABRADOR 1998
START_DATE_TIME = 7-MAR-1998 14:45:07.25
END DATE TIME = 7-MAR-1998 14:54:33.25
INITIAL LATITUDE = 54.1527
INITIAL LONGITUDE = -56.0417
END LATITUDE = 54.1527
END LONGITUDE = -56.0417
MIN DEPTH = 1.5
MAX DEPTH = 197.2
SAMPLING INTERVAL = 0.25000000
SOUNDING = 200.0
DEPTH_OFF_BOTTOM = 2.8
EVENT COMMENTS = 6-MAY-1998 10:01:13 PRESSURE OFFSET OF 0.431 ADDED

**Table 14.5.5.2 1998 CTD station at beacon 2374, upcast data**

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 5 | -1.7987 | | -1.7988 | |
| 10 | -1.7971 | | -1.7972 | |
| 15 | -1.7971 | | -1.7973 | |
| 20 | -1.7969 | 32.8390 | -1.7972 | 26.4239 |
| 25 | -1.7967 | 32.8405 | -1.7970 | 26.4250 |
| 30 | -1.7967 | 32.8405 | -1.7971 | 26.4251 |
| 35 | -1.7964 | 32.8401 | -1.7969 | 26.4247 |
| 40 | -1.7962 | 32.8398 | -1.7968 | 26.4245 |
| 45 | -1.7960 | 32.8398 | -1.7967 | 26.4244 |
| 50 | -1.7959 | 32.8398 | -1.7967 | 26.4244 |
| 55 | -1.7959 | 32.8398 | -1.7967 | 26.4245 |
| 60 | -1.7957 | 32.8397 | -1.7966 | 26.4243 |
| 65 | -1.7955 | 32.8395 | -1.7965 | 26.4242 |
| 70 | -1.7954 | 32.8394 | -1.7965 | 26.4242 |
| 75 | -1.7953 | 32.8397 | -1.7964 | 26.4244 |
| 80 | -1.7946 | 32.8394 | -1.7959 | 26.4242 |
| 85 | -1.7945 | 32.8398 | -1.7959 | 26.4245 |
| 90 | -1.7940 | 32.8392 | -1.7955 | 26.4239 |
| 95 | -1.7942 | 32.8394 | -1.7957 | 26.4241 |
| 100 | -1.7942 | 32.8395 | -1.7958 | 26.4242 |
| 105 | -1.7945 | 32.8395 | -1.7962 | 26.4242 |
| 110 | -1.7941 | 32.8396 | -1.7959 | 26.4243 |
| 115 | -1.7941 | 32.8396 | -1.7961 | 26.4243 |
| 120 | -1.7942 | 32.8397 | -1.7962 | 26.4244 |
| 125 | -1.7944 | 32.8398 | -1.7965 | 26.4245 |
| 130 | -1.7926 | 32.8412 | -1.7948 | 26.4256 |
| 135 | -1.7880 | 32.8417 | -1.7903 | 26.4259 |
| 140 | -1.7835 | 32.8435 | -1.7859 | 26.4272 |
| 145 | -1.7812 | 32.8430 | -1.7837 | 26.4268 |
| 150 | -1.7810 | 32.8445 | -1.7836 | 26.4280 |
| 155 | -1.7802 | 32.8469 | -1.7829 | 26.4299 |
| 160 | -1.7675 | 32.8618 | -1.7703 | 26.4417 |
| 165 | -1.7388 | 32.8713 | -1.7418 | 26.4489 |
| 170 | -1.7175 | 32.8798 | -1.7206 | 26.4554 |

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 175 | -1.6996 | 32.8819 | -1.7028 | 26.4566 |
| 180 | -1.6910 | 32.8997 | -1.6943 | 26.4708 |
| 185 | -1.6483 | 32.9245 | -1.6518 | 26.4900 |
| 190 | -1.6217 | 32.9290 | -1.6254 | 26.4929 |
| 195 | -1.6066 | 32.9358 | -1.6104 | 26.4982 |

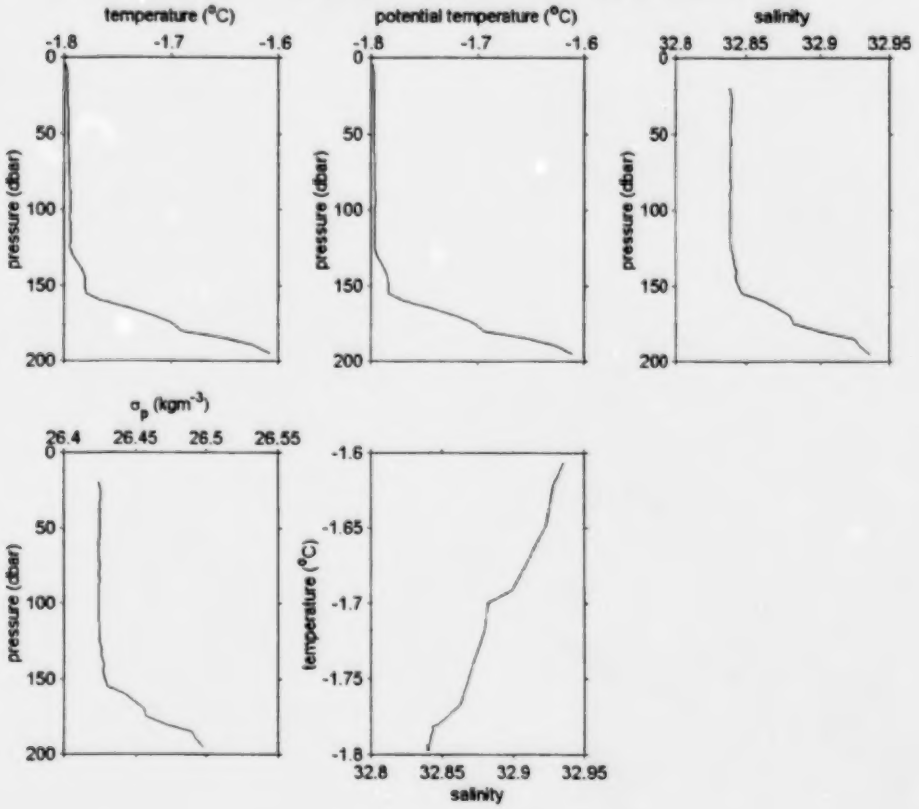


**Figure 14.5.5.2 1998 beacon 2374 station CTD and T-S profiles, upcast**

### 14.5.6 1998 beacon 2479 station

FILE SPECIFICATION = CTD_98903_ICEBEACON2479_1_DN.ODF
CRUISE_NUMBER = 98903
CRUISE_NAME = HAMILTON BANK CAST 05
CRUISE_DESCRIPTION = LABRADOR 1998
START_DATE_TIME = 7-MAR-1998 13:30:54.00
END DATE TIME = 7-MAR-1998 13:36:18.75
INITIAL LATITUDE= 53.7122
INITIAL LONGITUDE = -55.6719
END LATITUDE = 53.7122
END LONGITUDE = -55.6719
MIN DEPTH =1.7
MAX DEPTH = 135.4
SAMPLING INTERVAL = 0.25000000
SOUNDING = 140.0
DEPTH_OFF_BOTTOM = 3.3
EVENT COMMENTS = 6-MAY-1998 10:02:49 PRESSURE OFFSET OF 0.621 ADDED

**Table 14.5.6.1 1998 CTD station at beacon 2479, downcast data**

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 5 | -1.8004 | 32.8240 | -1.8004 | 26.4117 |
| 10 | -1.8007 | 32.8437 | -1.8009 | 26.4277 |
| 15 | -1.8005 | 32.8497 | -1.8008 | 26.4326 |
| 20 | -1.8004 | 32.8520 | -1.8007 | 26.4345 |
| 25 | -1.7991 | 32.8530 | -1.7994 | 26.4352 |
| 30 | -1.7958 | 32.8556 | -1.7962 | 26.4373 |
| 35 | -1.7952 | 32.8570 | -1.7957 | 26.4384 |
| 40 | -1.7949 | 32.8582 | -1.7955 | 26.4394 |
| 45 | -1.7948 | 32.8587 | -1.7956 | 26.4398 |
| 50 | -1.7950 | 32.8594 | -1.7958 | 26.4404 |
| 55 | -1.7950 | 32.8596 | -1.7959 | 26.4406 |
| 60 | -1.7951 | 32.8599 | -1.7961 | 26.4408 |
| 65 | -1.7950 | 32.8602 | -1.7961 | 26.4410 |
| 70 | -1.7951 | 32.8609 | -1.7963 | 26.4417 |
| 75 | -1.7961 | 32.8640 | -1.7973 | 26.4441 |
| 80 | -1.7957 | 32.8647 | -1.7970 | 26.4447 |
| 85 | -1.7955 | 32.8652 | -1.7969 | 26.4452 |
| 90 | -1.7954 | 32.8657 | -1.7969 | 26.4455 |
| 95 | -1.7956 | 32.8662 | -1.7972 | 26.4459 |
| 100 | -1.7960 | 32.8667 | -1.7977 | 26.4464 |
| 105 | -1.7965 | 32.8672 | -1.7983 | 26.4468 |
| 110 | -1.7969 | 32.8674 | -1.7987 | 26.4469 |
| 115 | -1.7966 | 32.8677 | -1.7985 | 26.4472 |
| 120 | -1.7963 | 32.8679 | -1.7983 | 26.4474 |
| 125 | -1.7961 | 32.8682 | -1.7982 | 26.4476 |
| 130 | -1.7956 | 32.8685 | -1.7978 | 26.4478 |
| 135 | -1.7949 | 32.8688 | -1.7972 | 26.4481 |

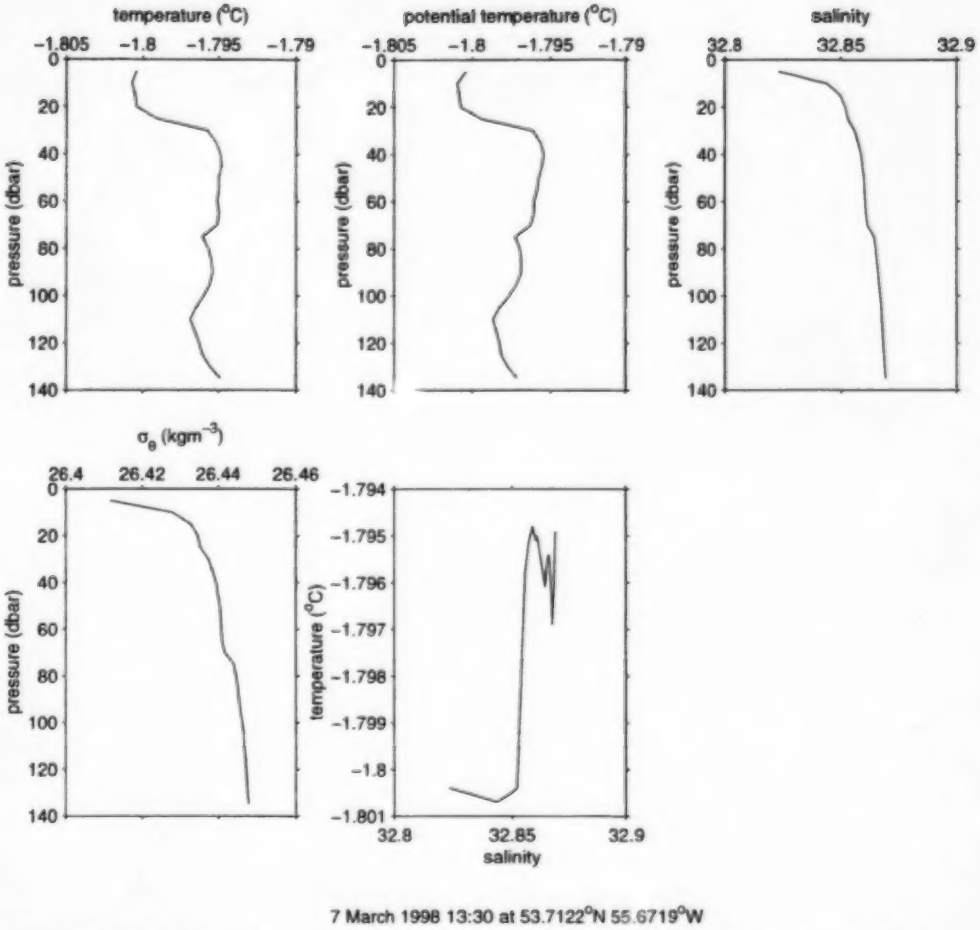


**Figure 14.5.6.1 1998 beacon 2479 station CTD and T-S profiles, downcast**

FILE SPECIFICATION = CTD_98903_ICEBEACON2479_1_UP.ODF
CRUISE_NUMBER=98903
CRUISE_NAME = HAMILTON BANK CAST 05
CRUISE_DESCRIPTION = LABRADOR 1998
START_DATE_TIME = 7-MAR-1998 13:36:33.75
END DATE TIME = 7-MAR-1998 13:43:18.75
INITIAL LATITUDE = 53.7122
INITIAL LONGITUDE = -55.6719
END LATITUDE = 53.7122
END LONGITUDE = -55.6719
MIN DEPTH = 2.5
MAX DEPTH = 135.6
SAMPLING INTERVAL = 0.25000000
SOUNDING = 140.0
DEPTH_OFF_BOTTOM = 3.5
EVENT COMMENTS = 6-MAY-1998 10:02:49 PRESSURE OFFSET OF 0.621 ADDED

**Table 14.5.6.2 1998 CTD station at beacon 2479, upcast data**

| pressure (dbar) | temperature (°C) | salinity | potential temperature (°C) | $\sigma_\theta$ (kg m$^{-3}$) |
|---|---|---|---|---|
| 5 | -1.8008 | 32.8154 | -1.8009 | 26.4047 |
| 10 | -1.8008 | 32.8470 | -1.8009 | 26.4304 |
| 15 | -1.8006 | 32.8541 | -1.8008 | 26.4362 |
| 20 | -1.8004 | 32.8551 | -1.8007 | 26.4369 |
| 25 | -1.7992 | 32.8554 | -1.7995 | 26.4372 |
| 30 | -1.7964 | 32.8581 | -1.7968 | 26.4394 |
| 35 | -1.7957 | 32.8592 | -1.7962 | 26.4402 |
| 40 | -1.7953 | 32.8600 | -1.7959 | 26.4409 |
| 45 | -1.7953 | 32.8609 | -1.7960 | 26.4416 |
| 50 | -1.7955 | 32.8613 | -1.7962 | 26.4419 |
| 55 | -1.7954 | 32.8614 | -1.7963 | 26.4420 |
| 60 | -1.7954 | 32.8617 | -1.7964 | 26.4423 |
| 65 | -1.7953 | 32.8620 | -1.7963 | 26.4425 |
| 70 | -1.7956 | 32.8629 | -1.7967 | 26.4432 |
| 75 | -1.7956 | 32.8629 | -1.7968 | 26.4433 |
| 80 | -1.7961 | 32.8648 | -1.7974 | 26.4448 |
| 85 | -1.7963 | 32.8663 | -1.7977 | 26.4460 |
| 90 | -1.7957 | 32.8667 | -1.7971 | 26.4463 |
| 95 | -1.7957 | 32.8669 | -1.7973 | 26.4465 |
| 100 | -1.7959 | 32.8674 | -1.7976 | 26.4469 |
| 105 | -1.7964 | 32.8677 | -1.7982 | 26.4472 |
| 110 | -1.7966 | 32.8677 | -1.7985 | 26.4472 |
| 115 | -1.7965 | 32.8679 | -1.7984 | 26.4473 |
| 120 | -1.7960 | 32.8681 | -1.7980 | 26.4475 |
| 125 | -1.7958 | 32.8688 | -1.7979 | 26.4480 |
| 130 | -1.7956 | 32.8692 | -1.7978 | 26.4484 |
| 135 | -1.7950 | 32.8695 | -1.7973 | 26.4486 |

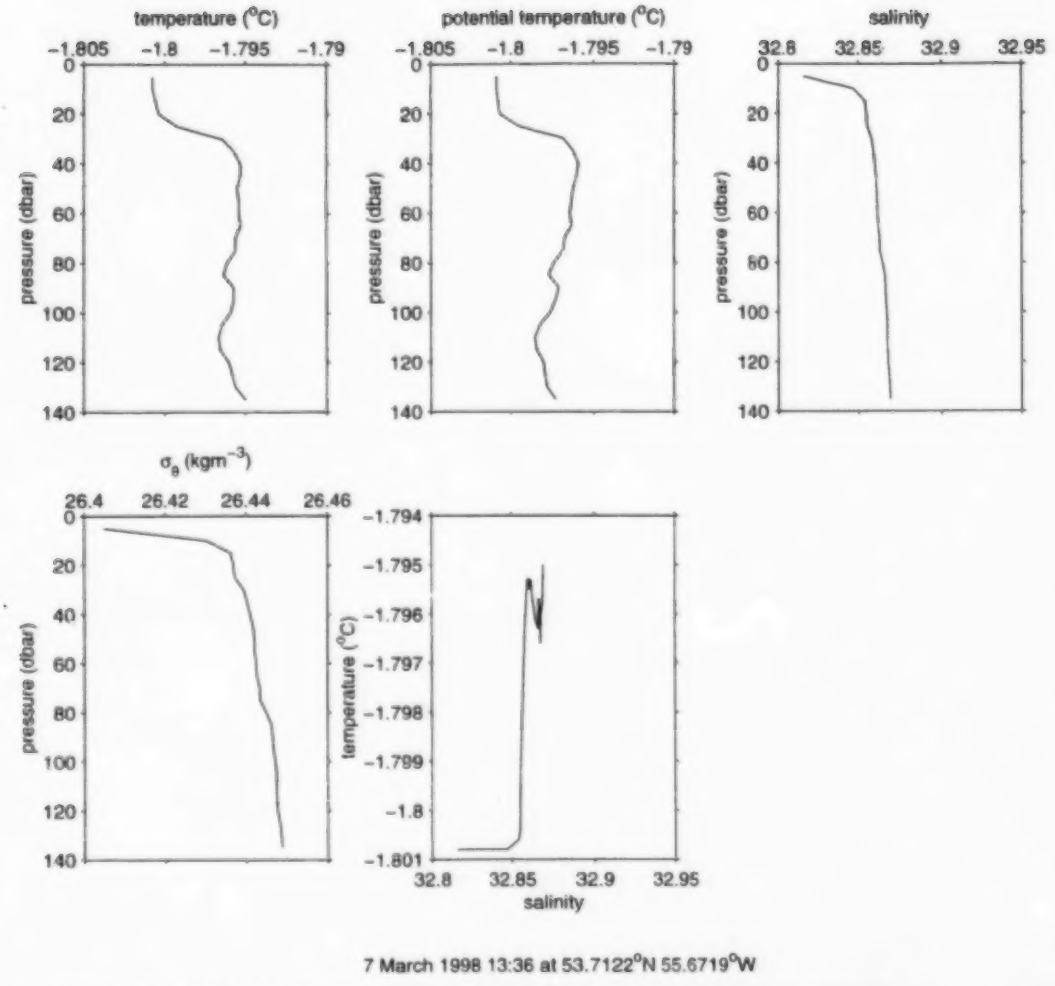


**Figure 14.5.6.2 1998 beacon 2479 station CTD and T-S profiles, upcast**